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STUDY ON NUTRITION INTERVENTION PROGRAMME IN MAHARASHTRA -

PRELIMINARY REPORT

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1. Introduction:

A team of experts visited all the manufacturing facilities located in Dugad (Bhiwandi), Satara, and Chandrapu and held discussions with officers of ICDS, manufacturers and other concenred people in order to get a realistic picture regarding the ongoing programmes and their effectiveness. Visits were also made to a number of consumption centres with a veiw to understand the working conditions in these Centres, the attitude and efficiency of people involved in administering the programme and monitoring the response of the recipients. This is an initial study which will be followed up by a more exhaustive round of visits and discussions. The details of the visit and the people met by the are given elsewhere these (Annexure I). The observations, findings and recommendations based on the visits are given in this report.

2. Recipes:

Basically there are two recipes being used for the manufacture of shelf-stable powdered products for distribution to the consumption centres, one based on corn-soya blend and salad oil (Sukhada) and the other based on roasted wheat and bengalgram.

In centres not coverd by the above products local foods are prepared by buying the raw materials and cooking them into traditional food preparations for direct feeding to

the children. From theoretical considerations the recipes seem to be satisfactory as they provide required nutrients if administered properly in adequate doses. However, protein levels need to be increased while fat content can be significantly lowered to bring it on par with other similar recipes. Though proximate composition details are available especially based on Bombay Municipal Laboratory analytical reports, no attempts seem to have been made either by the Directorate of ICDS or by the manufacturers to ascertain the adequacy of the recipe in terms of utilization by the beneficiaries when consumed under the prevailing conditions. The recipe also contains white sugar which is not generally recommended in view of its tendency to create dental problems. unusually both the recipes contain added vegetable oil which is not generally recommedned in view of their susceptibility to fast deterioration during heating as well as distribution and storage before consumption. Non inclusion of Vit. A and B-vitamins and minerals like calcium and iron in the recipe is a serious short coming as they influence significantly utilisation of proteins by the body.

3. Process:

Generally the process followed by the manufacturers is roasting of the ingredients and blending them in certain proportions before packing them. It was found that in actual practice the process is not carried out adequately to give a product of acceptable quality. The limitations noticed were:

a) Instead of roasting wheat, the milled wheat products are roasted. It is an established fact that material with different particle size cannot be uniformlly roasted and any attempt of roasting such a material will lead to both charring as well as inadequate roasting in the same product.

b) It is not clear as to why wheat has to be ground in roller flour mills as the latter is used only to get refined wheat products like maida. In this particular case the flour mill has supplied a product with unacceptable levels of bran and a high degree of coarseness;

c) Instead of using bengalgram dhal the manufacturer is using whole bengalgram which is roasted inadequately resulting in improper flavour and aroma development. The flour is coarse and moderate size husk particles are visible in the material.

d) Raw-materials like wheat and bengalgram do not conform to minimum safety standards as prescribed by PFA. The major defects noticed are shrievelled grains, insect infestation and iron filings (sugar) and oil of indifferent quality.

e) The basic principle of blending is that inagredient should be as far as possible of uniform particle size. However, invariably the manufacturer is trying to blend

2/3 articles of grossly varying particle size into homogenous products. This has resulted in a product with uneven distribution and heavier and denser particles try to segregate during transportation and storage. During distribution to the beneficieries, different beneficiary will get different product profile from the same batch.

f) Any standard process of making a nutritious foods, calls for incorporation of vitamins and minerals in such supplementary foods so that the beneficiaries receive at least a part of their requirements through such foods. The process adopted for the manufacture in this case does not use these micro-nutrients.

g) The process followed is intensely manual with small size batch operations. There is neither process control nor quality control evident in these production centres. Each operator looking after a bhatti has his/her own perception of process leading to gross under-rosting/over roasting in many cases;

h) The major sources of oil sunflower and soyabean both contain fairly high concentration of unsaturated fatty acids. As they are susceptible to oxidation, their exposure to heat will have to be minimal to protect them from oxidative rancidity and other chemical changes. It was noted repeatedly that the oil during incorporation

is over heated which in turn affects the storagteability of the product and final taste at the consumers end;

i) Generaly bulk packing is avoided for products intended for nutrition programmes and as far as possible unit packs aimed at individual benefiaciary serve the purpose. However, due to cost considerations, 1/2 kg and 1 kg packs are considered practical alternatives. In Maharashtra the product is packed in HDPE woven sacks to distribution centres and it is left to the teachers/Anganwadi workers to portion it out to the benefiaciary. Such a system has an added disadvantage that incidence of spoilage during storage and transit even in one bag will affect a larger number of beneficiaries;

j) The bags are also reused without looking into "Cradle to grave" cycle of the packaging material and reused bags are invariably sources of insect and microbiological contamination.

k) No worthwhile process control features are incorporated in the production system which again contributed to uneven and non-uniform quality products.

4. Raw-Materials:

Under the centralised production system wheat is procured from Food Corporation of India as a part of the contribution from Central Govt. and it is very difficult for the

manufacturers to exercise any control over the quality of this input. However, keeping in view the ultimate destination of the product, it should be imperative to incorporate precleaning and sorting step before wheat is channelled into the production operation. Similarly some of the samples of bengalgram were found to be infested and of sub-standard quality. The presence of husk in the final product since the grain is used instead of dhal is likely to lead to adverse effects of protein utilisation by the beneficiaries when consumed. Soya flour which is procured from some of the large solvent extraction units needs careful quality assessment. There is a Bureau of Indian Standard specification for edible soya flour which needs to be strictly adhered to when it is used in the manufacture of edible products for human-beings. White sugar is used as sweetening material but in some cases presence of iron filings was detected when the product is consumed. While such sugar containing iron filings may not cause any injury when it is used for the preparation of beverages as it settles down, its presence is not desirable when used in dry products ready for direct consumption. Edible oil used also requries quality improvemnt and it is preferable to use refined oil instead of raw oils which have a tendency to deteriorate within a few days.

It is well recognised that any nutrition supplementary food especially to be given to children should conform to universally accepted standards. Generally many

manufacturers follow Bureau of Indian Standards specification for such foods (Annexure II). Government of Maharastra presently is deploying products based on donated soya corn blend or PDS wheat. The two centrally produced products, one based on corn-soya blend (Sukhada) and the other on PDS wheat have two different profiles. The first one is fairly attractive in apperance, reasonably good in aroma and has acceptable taste. The latter one based on PDS wheat is totally unacceptable as edible product, due to high fibre content, improper grinding, inadequate aroma development and lack of uniform sweetness. It is felt that the product does not provide adequate proteins when administered at the present level though from the calorie angle it is satisfactory. One of the products is regularly analysed (Sukhada) at the Municipal Laboratory, Bombay, but the analyses were invariably inconclusive as vital values for crude fibre, infestation and microbiological index are not determined even on a random basis. Fresh samples prepared by the manufacturer on specific request for conducting limited analyses and nutritional studies at CFTRI, Mysore with a view to get some idea about their overall quality. While chemical composition does conform to the claims made by the manufacturer the products especially the one based on wheat needs improvement in terms of the following:

1. Higher Protein content
2. Reduction of Crude Fibre.
3. Reduction in the particle size.

4. Improvement in palatability.
5. Reduction in Microbiological Load.
6. Improved Shelf life.
7. Fortification with Vitamins and Minerals to obtain the full potential of the proteins in the product.

It should be noted that under experimental conditions, the product performed well as adequate vitamins and minerals have been provided in addition to the experimental samples, indicating that quality of protein is above average and by proper formulation the potential can be tapped fully. Another encouraging factor is that the samples provided by the manufacturer is free from *E. coli* and Salmonella though the overall contamination level is too high. The above observations are to be confirmed with the field samples to be picked up by CFTRI experts in the course of the on going project. In fact some of the samples earlier collected from the field were found to be rancid in taste and chewy to bite making them unfit even for animal studies. In the next report to be submitted in March 1993, CFTRI would be providing more comprehensive data on the above.

6. Manufacturing Centres:

It is well known that any food manufacturing facility should have certain minimum standards in terms of location, construction and maintenance. BIS has laid down the requirements for a food factory which are based on Indian conditions. However, the 3 manufacturing Centres where the

centralised production of nutritious foods are being undertaken, do not conform to many of the minimum requirements laid down udner the BIS specifications. The major short-falls can be cited as:

a) The bulildings are not insect/fly proof making them vulnerable to product contamination from many vectors:

b) The buildings are not being kept clean through periodical maintenance and the roof walls and the floors can be the major sources of contamination to the product; c) The storage conditions of raw material as well as finished products cannot be considered satisfactory and major overhaul is requried to make them suitable for storage of food materials;

d) The equipments, gadgets and other utilities are not properly maintained and in some cases, active infestation was noticed. Probably they are never subjected to any preventive fumigation to avoid such active infestation;

e) The equipments and other handling facilities are not the appropriate ones that would meet the process parameters and their lay-out also requries some modification to make the operations more smoother and unhindered;

f) The personnel involved in the processing operation are ignorant of the basic aspects of the process besides

being unaware of the implications of the personal hygiene and sanitation. A major effort is required to train them in this direction; g) Adequate process control facilities do not exist to monitor the process right from the inputs to the final product at different stages; h) Adequate quality control facilities as well as personnel are lacking and no systematic analyses is being done of the product.

7. Consumption centres:

Many of the consumption centres visited are managed by Anganwadi workers and generallyl their upkeeping considered somewhat satisfactory, though some cases were noted where producs stored on the uncleaned floors, buildings were in shabby conditions and inadequate facility for storage with presence of ants and house flies; However, the following improvements can be thought of:

a) Storage of products without touching the floor or the wall and covering them with polythene sheets to prevent moisture absorption if they are to be stored for more than a few days;

b) Introducing a maintenance regimen whereby cleaning and repairs are undertaken frequently to prevent environmental contamination during preparation and serving time.

c) Anganwadi workers are given training to imbibe lessons to the benefiaries in the science of eating and the sense of hygiene. Probably a training programme for such workers will immensely contribute to upgradation of the programme on a long term basis.

During the discussion it emerged that at Anganwadi levels, there are a few problems which need to be sorted out. These include:

i) Supply of the product is irregular and in many cases grossly short of the set targets leading to problems of uneven distribution amongst the beneficaries;

ii) In many cases the Anganwadi workers report presence of fungus growth and insect infestation in the products when they are received;

iii) The beneficiaries invariably complain about monotonous taste of the products, feeling of dryness in the mouth, bitter taste, chewy texture due to presence of excess fibre, uneven sweetness, etc.

iv) The tendency for the product to form lumps and developemnt of black colour within a few days also were reported. In many cases small lumps were seen in the product on account of improper processing in the factory;

v) Though the programme is supposed to cover all the beneficiaries in a particular Centre many parents do not allow their children to eat especially poorak Ahar (PDS wheat-based) due to fear of dysentry;

vi) In some of the Centres rats, cats and monkeys cause considerable damage since they are not protected against their attack;

vii) Wherever local foods are prepared, time and fuel consumption are more than what is expected and especially cooking of moong dhal takes a lot of time;

viii) The quality of preparations made with local materials varies from day to day and the quality of raw materiasl procured also needs improvement.

8. General:

Based on the study it cannot be said with any degree of certainty that the present programme serves the purpose for which it has been formulated. Immediate action is called for in the following fronts:

a) Introdution of an alternative and a better product that will provide, besides a welcome change also as an example for the existing supplier to improve his product quality;

b) The existing products need improvements in terms of process, production facilites, packaging, distribution and storage;

c) The manufacturing facilities cannot be considered as completely satisfactory to undertake production of acceptable quality of human foods;

d) The existing programme should be reoriented to spread the message of sound nutriton amongst beneficiaries so that when they grow up they practice these norms.

e) The quality monitoring system requires to be considerably strengthened with a view to make the programme more effective and impact making. Both the existing staff involved in the programme as well as the beneficiaries need continuosu educational exposure in order to better appreciate the efforts of the Government.

ANNEXURE-I

OBSERVATIONS/COMMENTS OF CFTRI EXPERTS DURING VISITS TO PROCESSING CENTRES, WAREHOUSES AND CONSUMPTION CENTRES

CONTENTS

A) Visit to M/s Satguru Roller Flour Mill, Khopoli

B) Visit to the nutritonal food manufacturing plant, of the Federation, Bhivandi

C) Visit to the 'Sukhada' manufacturing plant of the Federation, Chandrapur.

D) Visit to the Nutritional good manufacturing plant of the Federation, Satara.

E) Visit to the district office of the Federation, Nasik and the product godowns in the area.

F) Visit to some consumption centres in Nasik district.

G) Visit to the go-downs in Dhule and Jalgaon districts.

H) Visit to different consumption centres in Dhule and Jalgaon districts

I) Visit to some beneficiary centres in Sangli and Satara districts.

J) Visit to some anganwadis in Nagpur and Chandrapur districts.

K) Report of analyses of samples.

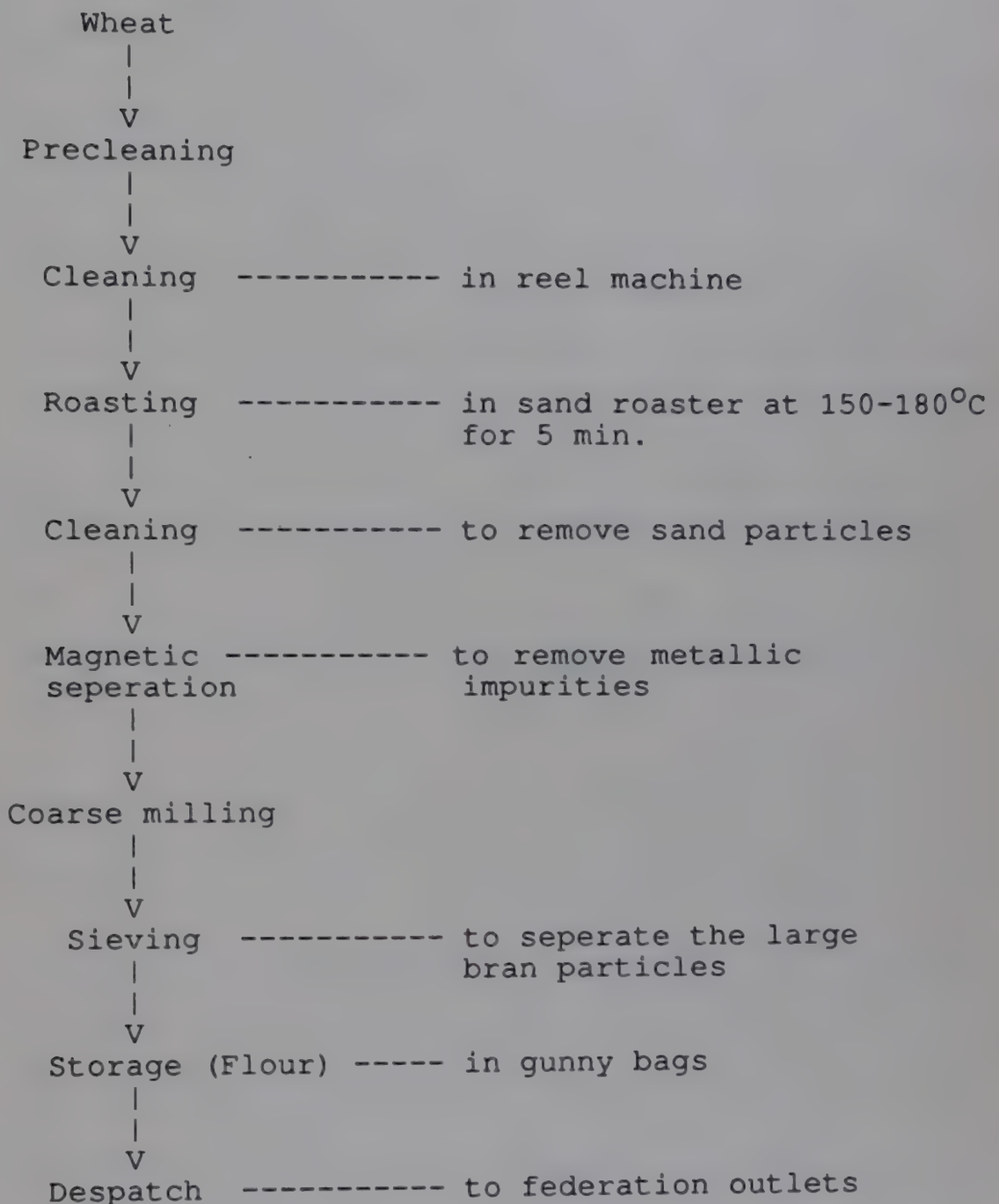
A. Vist to M/s. Satguru Roller Flour Mills, Khopoli.

The Maharashtra State Co-operative Marketing Federation (MSCMF) purchases wheat from the Food Corporation of India. The wheat is got milled as per the operations and schedules recommended by the Federation at M/s. Satguru Roller Flour Mills, Khopoli.

CFTRI experts visited the unit of M/s. Satguru Roller Flour Mills, Khopoli on 25.6.92 along with representatives of MSCMF and the Director of concerned Mill and inspected the storage and the processing line. The Satguru Roller flour mills, khopoli performs the milling operation on contract basis exclusively for the Maharashtra state cooperative Marketing Federation (Marked) for the manufacture of supplementary (Nutrition) Food (WSF).

The samples of raw materials and finished products were drawn for evaluation. The processing operation reported to be followed is as under:

Flow Diagram



Wheat purchase as well as milling schedule is planned by the federation to match its nutritious food manufacturing programme. It was gathered that the milled wheat is stored for not more than 2-3 weeks in the Mill's premises. Fumigation is reported to be carried out in the mill twice a year. The mill with a capacity of 100 TPD processes about 1000 tonne wheat per month.

At the time of visit, the mill was not in operation due to power failure. Hence the information on exact process parameters as well as samples at different stages could not be ascertained. However, samples of wheat to be processed, cleaned wheat prior to roasting and milled product of the previous run from the finished goods store were collected for analysis.

CFTRI experts had a meeting with the Deputy Secretary, (DS) RDD Chamber, Mantralaya, Govt. of Maharashtra on 4.7.92.

It was given to understand that the complaints recieved about the school lunch packets is that the lunch packet becomes mouldy due to insufficient packaging. Also it will was affected by rodent attacks. Compared to the Sukhda which is the CARE product, the one based on wheat (WSF) manufactured by MARKFED, was found to be less appealing. The oil content in Sukhada is 10% as against 5% in the wheat based product.

The DS informed that the general practice is to cook the WSF on the spot and serve. Also, the government is thinking in terms of removal of gram husk before preparation due to bitter taste of the product experienced by many beneficiaries.

Dr. R.G. Chitre, Former Consultant Nutrition (WHO) and adviser to MARKFED has opposed both the ideas on the grounds that (1) the handling labour do not have adequate knowledge of hygiene, sanitation and cooking which is destructive to the nutrients and (ii) fibre is a necessary component in the food and if removed, it raises the cost of production.

There is a desire on the part of the government to suggest recipes using local food so that it could be provided when the supplies fail to reach the schools due to problems like strike.

Visit to the nutritional food manufacturing plant, Bhivandi

CFTRI experts, Jt. Director, ICDS and representatives of Markfed visited the factory of the Maharashtra State Co-operative Marketing Federation at Dugadphat (Bhivandi), Thane district on 21.7.92 to stuty the existing manufacturing practices of supplementary nutritional food for government of Maharashtra. The manufacturing processes, storage of raw materials and finished products were studied in detail.

The samples of raw materials and finished products and packaging materials have been drawn for evaluation.

The unit claims to have an installed capacity of 100 TPD supplementary food. At present, they are reporting production of 70-85 TPD of supplementary food in the unit. The unit produces both the types of supplementary foods (i) corn-soya blend based food for CARE programme and (ii) WSF, the wheat based supplementary food for ICDS as well as school feeding programmes.

There are 42 Kadai's and a batch of 10 kgs is finished every 10 min. 400 workers are engaged on contract basis as supply order by the government is on annual basis.

1 Raw materials:

B-11. Milled wheat: The unit gets wheat processed from M/s. Satguru Roller flour mills, Khopoli on contract basis in gunny bags. There is no specific particle size. However on close examination, it was found to be a coarse milled product containing moderate size bran particles.

B-12 Roasted bengal gram flour: Bengal gram is purchased by the Federations roasted in the unit and milled as a whole. The husk is not removed and moderate size husk particles were found to be present in the coarse flour.

B-13 Sugar: Sugar is procured by the Federation from the open market.

B-14. Defatted soya flour: Defatted soya flour is reported being purchased from leading soya processig units in the

country and are received HDPE woven sacks of capacity 50-60 kgs.

B-15 Vegetable oil: The unit uses refined cotton seed/sun flower oil processed in oil mills of the Federation at Jalna/ Khamgaon.

The oil is brought in oil tankers and pumped into M.S. Oil storage tank with a capacity of 50 Tonnes. For daily use, the oil is collected from the tank through a tap at the bottom into M.S. drums/barrels. This oil, is used for making wheat based supplementary food (WSF). The oil on spot examination was found having slight dark colour, strong odour besides being cloudy.

B-16 Corn-soya blend: Corn soya blend (CSB) is supplied by the CARE in 20 kgs packs using polythene lined multiwall paper sacks. This comes from USA by Ship. CSB has a typical corn taste and flavour.

B-17. Salad oil and refined soya oil: These also come from USA by Ship. It is supplied by CARE in M.S. drums of 5 gallons capacity. Refined soya oil is yellow coloured and clear, though same slight odour was noticeable. As per label, the oil contains TBHQ and citric acid in propylene glycol.

ii) **B-2 Processing:**

B-21 CSB based supplementary food (SUKHADA) for CARE programme.

One kg of refined soya oil is added in a MS frying pan (Kadhai) being heated with Kerosene fired burner. 6.5 kg of CSB is added to the hot oil. Both are measured in vessels which are volumetrically standardised. After roasting for 3-4 min, the material is transferred to another Kadhai. 2.5 kg of sugar taken in a volumetrically standardised vessel was added and mixed well with a laddle. This was then sieved through coarse sieve fixed in a wooden frame to break the lumps. Finally, it was filled into 25 Kg printed HDPE woven sacks and stitched.

All operations are done mannually.

B-22 Wheat based supplementary food (WSF): (For Central Govt. funded ICDS programme as well as state government funded school feeding programme).

Half kg of oil (refined sun flower/cotton seed oil) is heated in Kadhai, 5 kg of roasted milled wheat is added to it and roasted by agitating with laddle. Half kg of defatted and roasted soya flour bengal gram flour is added and roasting is continued for 3-4 min. The mass is transferred to another Kadhai made of MS and mixed with 2.5 kg of sugar. Then it is passed through a coarse sieve, fixed in wooden frame to break the lumps. It is collected in rectangular bins having wooden frames. Finally, it is filled into polythene lined HDPE wooven bags of capacity 10 kg and stitched. It is then stored for despatch.

B-23 Bengalgram processing:

Bengalgram is emptied from gunnybags into a hopper/bin and elevated for pre-cleaning. After pre-cleaning it is roasted in a horizontal sand roaster of capacity 2.5 tonnes per hour. The roaster is heated with kerosene fired burner at about 180^{o}C and then pulverised to a coarse meal.

B-24 Other observations

The bran particles in the roasted milled wheat were found to be very coarse. In bengal gram sample collected, most of the kernels were shrivelled, and significant number of insect infested kernels with holes were visible.

During the visit by the experts, it was found that the roaster of the factory was out of order and roasted bengalgram was being obtained from the Satara unit of the Federation. The main pulveriser also was reported to be out of order. The standby pulveriser made by a Gujarat firm was being used.

It was also seen during the visit that a truck of CSB was being unloaded and several bags were found to be torn causing spillage of the product on to the floor.

The unit has a reasonably good laboratory to carry out routine proximate analyses of the raw materials and finished goods. The laboratory tests were reported to be carried out for moisture, protein, fat, total ash and acid insoluble ash. The routine test records were inspected and found to be properly maintained.

C. Visit to the Sukhada manufacturing plant of the Federation, Chandrapur.

The CFTRI experts visited the Federation factory at Chandrapur manufacturing 'Sukhada', The plant has an installed capacity of 30 M.T. per day (in 3 shifts). But the daily production is reported to be 45 M.T. The factory runs on an average for 22 days in a month. The production has been increased due to demand and monthly production of 1000 M.T. on an average is achieved.

C-1 Raw materials

The production system designed is semi-automatic in nature. The raw materials used in preparation of Sukhada are corn soyablend (CSB) powder and refined soya oil supplied under aid from USA to India, sugar from sugar mill, Maharashtra in the ratio of 65:25:8 respectively.

CSB powder packed in HDPE bag (25 kg) having paper packing, the vegetable oil in galvanised steel drum (194.5 kg) and sugar in gunny bags (100 kg). are stacked on specially made wooden planks. They are arranged in 30 layers.

The monthly requirement of CSB is 25,000 to 30,000 bags, of sugar is 2500 bags and that of oil is 500-550 drums.

The store house is spacious and well-ventillated. But nets are not fixed on the window frame making it susceptible to winged pests. Due to sugar spillage some ants were seen

in the premises. The raw materials seemed to be free from extraneous matter and the quality is apparently satisfactory.

C-2 Processing operation: CSB is fed to the roaster using a trolley. The roaster with a capacity of 500 kg per hour is made up of stainless steel and having double jacket. The heating is done by thermic oil. The roasting is done at 180^{o}C for 25 min. It is a batch process and 325 kg of CSB are roasted per batch.

125 kg of sugar and about 50 kg of refined vegetable oil (about 4 buckets) are added to the roasted CSB in a mixer. Mixing is done for 5 min in batches. The finished product is filled into HDPE bags. The bags containing 25 kg of material are stitched by stitching machine which is electrically operated.

Although packing is done manually, the labourers are not provided with gloves and caps. The ants and the flies were seen in the factory and no one seems to be sensitive to the potential hazards of such pests.

The finished product is analysed in the quality control laboratory attached to the factory.

The proximate composition of the sample produced on 27.7.92 as recorded by the Q.C unit indicates the following profile:

Moisture (%)	: 4.7
Total ash (%)	: 2.3
Acid insol. ash (%)	: 0.04
Crude fat (%)	: 12.7
Crude fibre (%)	: 0.3
Crude proteins (%)	: 13.8
Calorific value	: 456.5 cals/100 gm

The product is tansported to the ware houses in the district head quarters under the control of the D.M.O. From there, it is transported through lorries, or minitrucks to various centres. Sukhada is transported to the inaccessible places by bullock carts, on donkeys and some times manually.

D. Visit to the nutritional food plant of the Federation, Satara

CFTRI experts accompanied by the representative the Federation visited the plant manufacturing the supplementary nutritions food belonging to the latter at Satara.

The plant manufactures wheat based purak ahar (WSF) for Anganawadis of Satara, Sangli, Solapur, Kolhapur, Ratnagiri, Sindhudurg, Pune, Jalgaon, Buldhana, Bhandara, Amravati and Nagpur districts. It also manufactures wheat based paushtik ahar (WSF) for schools of Satara, Sangli, Solapur, Kolhapur, Ratnagiri, Sindhudurg, Ahmednagar, Pune Chandrapur, Aurangabad, Buldhana, Yavatmar, Bhandara, Gadchiroli, Jalna, Amraoti and Nagpur districts.

It is learnt that only one qualified food technologist works with the Federation. The factory works in two shifts to produce 75 tonnes of wheat based supplementary food per day. It works 20-25 days in a month. About 100 contract workers are engaged in production per shift.

D-1 Raw materials

Roasted wheat meal is supplied by M/s Satguru Roller Flour Mills, Khopoli in gunny bags; Bengalgram is purchased by District Marketing Officers of the Federation at selective districts and sent to the factory in gunny bags. Bengal gram is roasted and purverised in the plant itself. Defatted/toasted soya flour is supplied by soya processing units like General foods ltd., Indore, and ISM Foods, Ltd., Vidisha in HDPE woven bags. Sugar (S-30 grade) is purchased on tender basis from Ajinkyatara Co-operative Sugar Factory, Shendre and Satara Sahakari Sakhar Karkhana, Kisanwirnagar, Satara district. Refined vegetable oil (sunflower/cotton seed) is received from oil mills of the Federation located at Jalna and Khamgaon through oil tankers.

Vegetable oil is stored in two MS vertical cylindrical tanks with a storage capacity of 54 tonnes each. For daily requirement, oil is pumped into cylindrical barrels and from barrels into small containers. It was learnt that tanks are cleaned from time to time by removing the sludge and wiping the surface with a cloth. Refined sunflower oil being used in the process was slightly turbid, and yellow having a mild odour.

Soya flour bags were stacked on tarpaulin sheet. Wheat meal bags were stacked on bare cemented floor. 114 tonnes of wheat meal are required for 3 days.

Sugar is stored on tarpaulin sheets spread on cemented floor; whole, roasted and unroasted bengalgram was stored in gunny bags and stacked on the floor. Pulverised bengal gram flour was stored in HDPE woven sacks, once used for storing soyflour, directly on the cemented floor.

D-2 Processing operations

ACC constructed storage and production halls were clean and well ventilated. Wire mesh nets were fixed to the windows, and no cobwebs were noticed along with wall/roof corners; no insects/rodents were noticed in the plant.

The stock of raw materials was just adequate for 10 days as seen in the periodic statement of stock records. Almost entire production of supplementary foods was being lifted for despatch every day. It was learnt that the raw material godown was fumigated by Central Warehousing Corporation about a year back.

Bengal gram roasting, grinding and storage were done in a big hall of ACC construction. Roasting was done in a horizontal rotating sand roaster by hot air heated by kerosene fired burner. Bengal gram bags are emptied into a bin from which it is lifted by bucket elevator to

precleaner/sifter. By this, the stones, chaffs, foreign grains etc are removed. Bengal gram is roasted at about 230-250°C for about 3-4 min. Roasted bengal gram is air classified to remove foreign matter, if any. It is allowed to cool on gunny bags. Then it is pulverised in a hammer mill having cyclone/dust collection accessories. Dehulling is not done prior to pulverising.

Wheat meal was almost raw to taste. Roasted flavour was not noticed to any significant level. Medium to large size bran particles were present in the meal. Entire production is being carried out through contractors. These contractors were provided with ten units of kerosene fired MS roasting pans (Kadhais) each for carrying out production. Each contractor will put his number and date of manufacturing of the product on the printed slip to be kept in the bag of food before stiching it. About 2 tonnes of food can be prepared in one roasting pan in 8 hrs.

5 kg wheatmeal taken by MS volumetric measuring vessel is roasted in Kadhai for about 75 seconds and 500 ml of veg. oil is added to it. Hot mixing is continued for another 90 secs. 1.5 kg of roasted bengal gram flour and 0.5 kg of defatted soyaflour are added while continuing the roaster for another 2 min. 2.5 kg of sugar is added and the mass is mixed for 15-20 seconds and then sifted through 8x20 size sieve fixed on rectangular wooden frame. All ingredients are added with volumetric measures. The material is collected on

GI sheet fixed in a rectangular frame. It is allowed to cool, then filled in polythene HDPE woven sacks. The bag is weighed on 25 kg. Avery weighing scale. Printed slip with manufacturing date is inserted and the bag is stitched with a stitching machine. Presence of bran is predominant in finished product and it leaves fibrous after taste in the mouth. It also tastes a bit raw when consumed as such. There is provision for 44 kadhais in the plant. However, only 25-30 Kadhais are used for convenience. Despatches to the beneficiacny centres of Satara district are directly from the factory and through the DMOS in the remaining districts.

The following samples were drawn for evaluation.

Wheat meal, bengal gram (unroasted and roasted) pulverised bengal gram flour defatted soya flour, refined sunflower oil and wheat based paushtik ahar.

E. Visit to the District office of the Federation, Nasik and product godowns in the area.

CFTRI experts discussed with the District Marketing Officer, of the Federation, on 16.7.92 regarding storage and distribution of supplementary food under ICDS and school feeding programmes. Supplementary food processed at various processing units of the federation are received at the central godown at Nasik in hired trucks. This is stored in the godown from were further distribution takes place to the beneficiary centres in the entire district according to the lists provided by Dy. CEO - child and women welfare and DEO. The distribution cost is met by the Federation.

The godown was found to be reasonably clean one. Bags were stored on the tarpaulin sheet laid down on the cemented floor.

F. Visit to some consumption centres in Nasik district.

CFTRI experts visited different consumption centres of supplementary food in Nasik district from 16.7.92 to 19.7.92.

Discussions were held with the District Educational Officer, District Project Officer (women and child care) regarding the supplementary nutritional food programme. Besides meeting the District Marketing Officer the storage godown of the Federation also was inspected. The visit covered many beneficiary centres of Anganawadies and Schools at Vilholi, Raigadnagar, Pangari (Bu), Vavi, Pathare (Bu), Kolgaonmal (Vasti), Kolganmal (Bungalow) in Nasik district to inspect distribution and storage of nutritional food.

The programme covers all tribal areas and all schools of the tribal talukas viz Surgana, Igatpuri, Peth, Kalwan, Harsool, Dindoni, Nasik and tribal Villages of other talukas WSF was distributed to students of 1st to 4th std. The supply of ahar during the year was irregular, inconsistent and far short of the set target. Also, there are complaints about the quality and taste. Fungus growth and insect infestation were noticed in several bags. The product is under toasted having bitter taste and it invariably leaves fibrous portion in the mouth after eating. The DEO was the

view that if under roasted to discontinue the scheme, if the supply continues to be irregular.

Regarding the distribution of Sukhada under ICDS scheme, SS plates, glasses, volumetric measure and buckets have been provided to most of the anganawadis. GI rectangular tanks are provided for storage of Sukhada. Although taste is reasonably good periodic changes and diversified products are being sought by the beneficiaries. Fungus growth was noticed in a few cases particularly during heavy monsoon.

The primary schools of Vilholi village and Raigsadnagar village in Nasik taluk were visited on 17.7.92. Supply of WSF ahar is irregular and short of the actual requirement. During the academic year 1992-93 no supply has been made. Based on the previous experience, expressed their dislike for WSF. Children do no like the ahar as it is less palatable and chewy in texture. Also, these is no provision for drinking water in school.

The cleanliness of anganwadi in Vilholi village is satisfactory. SS plates are provided for eating Sukhada. About 13.5 kgs of Sukhada are distributed per day among 149 beneficiaries which include children from 6 months to 6 yrs (numbering 135), pregnant and lactating mothers (numbering 22) and two staff members. Each child gets 75 gms while 150 gms are given to each of the women and the highly under

nourished children. Weights of the children are taken monthly and growth charts are made (Table 1).

Although the scheme is applicable to people below poverty line, even well-off rich people demand for these benefits. The storage of Sukhada was satisfactory. The balance of 305 kgs was stacked over cemented circular pallet. The supply of Sukhada is regular as per records. Generally, there is no complaint about quality, palatability and packing conditions. Samples were collected for evaluation.

At the anganwadi of Raigadnagar in Nasik district, the building was found to be leaking. The product is stored in MS circular tank provided by ICDS. Also SS plates, glasses, bucket and water tank are provided by ICDS. The supply is reported to be regular. About 10.5 kgs of Sukhada are distributed per day among 120 beneficiaries. They include 99 children upto 6 yrs including 8 highly under nourished, 19 pregnant and lactating mothers and 2 staff members. 75 gms of sukhada for each normal child and 150 gms for under-nourished and for women are distributed. Samples were collected for evaluation.

The Anganwadi of Pangri Badruk village in Sinnar taluk gets the regular supply. The beneficiaries include 43 children including 4 highly under-nourished ranging in age from 6 months to 6 years, 18 pregnant and lactating mothers and two staff members. About 7 kgs of Sukhada are distributed daily. There is no reported complaint regarding

the quality. Balance in stock was sufficient for almost a month. Samples were collected for evaluation.

At the anganawadi of Vavi village in Sinnar taluk, the beneficiaries include 50 children including two severly under nourished and 21 women. Daily distribution is about 7.5 kgs. The supply is regular. Samples were collected for evaluation.

There are 41 beneficiaries requiring 100 units of Sukhada. 35 children including 3 highly under nourished and 4 women get the benefit. 3.75 kgs per day are distributed. Supply is regular and there is no reported complaint about the quality of the product. Samples were collected for evaluation.

In the anganawadi at the kalgaonmal village in Sinnar taluk, 66 beneficiaries require 80 units. The daily distribution is about six kgs. Supply is almost regular though occasionally the stock gets exhausted. But the quality of the product is reported to be acceptable to the consumers.

At the anganwadi in Kolgaon Bungla Vasti in Sinnar taluk, 80 units of food are distributed among 58 benefiaries which include one undernourished child 13 pregnant women and lactating mothers. Daily requirement is 6 kgs. Supply is regular and there is no reported complaint regarding the quality. Samples were collected for evaluation.

77 beneficiaries of the primary school of Kolgaonmal in Sinnar taluk have not received WSF for 1992-93 so far. The last recorded receipt was on 10.10.91. Though some fungus growth was noticed with that consignment it was not recorded and no formal complaint seemed to have been sent to appropriate authorities.

A list of taluks containing the details regarding the number of beneficiaries and month wise distribution is given in Table 2.

G. Discussions with the officials and visit to the godowns in Dhule and Jalgaon district.

In Dhule district milk is identified as the major item for supply under the nutritions programme.

As a general rule milk is supplied to the beneficiaries wherever possible and the beneficiaries of the remaining school get the wheat based paushtik ahar (WSF). 150 ml of milk per beneficiary is provided by the local co-operative milk producers society. The Federation supplies wheat based paushtik ahar (WSF) to each school at the rate of 100 gms per beneficiary in single teacher schools. The scheme is applicable to the students of all the classes from 1st to 4th standard in the single teacher schools, where as in multiteacher schools, it is applicable to 1st standard students in non-tribal areas such as Shahada, Shirpur, Dhule and Sindkheda talukas. In all the schools of tribal areas such as Navapur, Akkalkua, Dhadgaon, Taloda, Nandurbar and

Sakri talukas and schools of tribal villages in the remaining talukas, the beneficiaries are the children from 1st to 4th standards.

However, the scheme is not being effectively implemented in many schools due to following reasons.

i. Local Milk Co-operative Societies which are supposed to supply milk are asking for substantial hike in the price of milk, as there has been steep escalation in the production cost of milk and there is reluctance to continued supply at the approved rate causing frequent programme dislocation.

ii. The Federation supplies paushtic ahar irregularly to schools leading to disruptions in the plant programme (Ref. table 3). Also, lesser palatability of WSF compared to Sukhada distributed under ICDS programme in anganawadis comes in the way of acceptability to a large segment of beneficiaries. The students do not seem to be relishing and invariably WSF is inferior in quality. Many times the food is wasted by the beneficiaries as they find it unpalatable. Primary school teacher's association, Dhule district. has even issued a press statement highlighting the above problem.

According to the Deputy CEO (Child and Women development), Dhule district, as per the decision of government of Maharashtra boiled eggs are distributed in 150 anganawadis located in the project area. In the remaining 1457 anganawadis belonging to Navapur, Akkal Kua, Shahada,

Taloda, Sakri, Shirpur, Dhadgaon, Sindkeda and Nandurbar talukas, Sukhada is distributed. There does not appear to be any complaint about the quality of the sukhada in the district.

The matter of distribution of supplementary food in the district was discussed with the DMO of the Federation. According to him the teachers feel wheat based paushtik ahar (WSF) inferior in palatability and nutritive value when compared with CSB based sukhada supplied by CARE. They are also aware that there is a significant difference in the formulations of the two nutritious foods, which affects the cost factor involved in their production. Teachers, hence, show practically no interest in distributing the WSF. Some times, they are even reluctant to take the delivery or accept less quantity than the set target. Also, when the delivery has to be done after the working hours, they are not available in the premises leading to other problems.

The godown belonging to the Federation for storing the supply food is of cement construction with roof of GI sheets. Bags are stacked on bare floor, on bamboo mats and also on tarpaulin sheet spread on the floor. No wooden pallets are being used to stack the bags. 40 tonnes of wheat based paushtik ahar (WSF) and 775 kg of CSB based sukhada were stored in the godown at the time of the visit. Also 237 bags of 25 kg each of sukhada which were rejected due to the inferior quality were also found to be stored in the godown.

The flooring was observed to be dirty having product spillage. Flocks of ants and houseflies were noticeable throughout the godown. Bags were stored by the side of the walls and oily taints on the wall could be seen. Cobwebs on the walls and roofs were also noticed. On the whole the storage conditions were not considered to be sound and foods stored in such godowns could be unfit for consumption.

H. Visit to different consumption centres in Dhule and Jalgaon districts.

The CFTRI experts visited various consumption centres of supplementary foods in the districts of Dhule and Jalgaon from 26th July 92 to 2nd Aug. 92.

Anganawadis under ICDS programme and schools were covered in villages of Dhule and Jalgaon districts (viz. Arvi, Varshi, Sindkheda, Chimthane, Vikharan, Virdel, Chopda, Chimchale, Mamalde, Aner, Hated, Vale, Nimgavan, Amalnar, Sankheda, Patonda and Fupnagari and observations were made regarding the implementation of supplementary nutrition programme. Discussions were held with the District Marketing Officers of the Federation, Deputy Chief Executive Officers (Child and Women Development), District Educational Officers of Dhule and Jalgaon districts and also with some of their colleagues at some taluks.

Twenty two samples of supplementary food were drawn from different schools and anganawadis in the Dhule and Jalgaon districts. Details such as sample code, type of

sample source from it is collected, date of manufacture and sampling date were called out through discussion and recorded data (Table 4).

H-1. Dhule District

Some of the anganwadis in Dhule district were visited on 29th July 92. The following observations were recorded.

Anganawadi of Arvi village in the Dhule taluk was visited on 29.7.92. Boiled eggs are distributed to 102 beneficiaries which include 91 children and 9 pregnant and lactating women. Only one egg is provided to each of the beneficiary irrespective of the nutritional level. Eggs are supplied by Jawahar C0-operative Poultry farm, Morane. It was observed that due to distribution difficulties. However the supllier does not provide replacement for broken/damaged eggs depriving some beneficiaries of their share.

In the Girl's primary school of the village, boiled cow's milk was distributed till Oct., 1989. Daily 6 litres were distributed. Milk was supplied by Rokde Hanuman Co-operative Milk Producer's Society, Arvi. In the Boy's Primary School also, milk was distributed till Oct., 1989. The distribution of milk is reported to have been stopped since then due to reluctance of the suppliers to accept the prices fixed by the government. No supply of any other food also is provided in lieu of milk.

About 130 units at the rate of 75 gms of Sukhada per unit are distributed to the beneficiaries in anganwadi of Varshi village belonging to sindkhed taluka. The anganawadi is generally clean and no complaints are reported about the quality of the product.

About 50 beneficiaries of the Boy's primary school of the village used to get the milk which is supplied by Nutan co-operative milk producer's society, Varshi. The scheme is not functioning since 27-3-91 due to the demand by the society a higher price for milk. Although every one is aware of the situation no food is served to the children, as no provision seems to have been made for such a contingency.

The anganwadi of Sindkheda has 124 children including one highly undernourished and 22 pregnant and lactating women. Eating plates have not been provided by ICDS to eat Sukhada. However, products is liked by the beneficiaries and the supply has been regular so far. If Sukhada is available, children attend the class regularly. Otherwise, they leave the classroom, often and absention increases. In the primary school for Boys of Sindkheda, the scheme of milk distribution is not working since March, 1989 due to demand of higher price for the milk by the milk producers co-operative society, Sindkheda.

The status of school feeding programme in some schools of Sindkheda block was reviewed in general (Table 5).

The beneficiaries of anganwadi of Chinthane village, Sindkheda taluka receive 9.75 kgs of Sukhada per day. The beneficiaries include 75 children including one under nourished child, and 22 pregnant and lactating women. The supply of Sukhada is regular as per the records. It was understood that some bags of sukhada were rejected due to off colour, lump formation, fungus growth and off-flavour. Samples were drawn for evaluation. Tearing holes were seen in the bags. Instances of faulty recordings on delivery slips were also mentioned.

The anganwadi of Vikharan in Sindkheda taluka of Dhule district had 86 children 10 women and 2 staff as beneficiaries. This includes two highly under nourished. About 8.624 kgs of Sukhada are distributed to the beneficieries. At the time of visit 116 kgs of the product were on hand and on visual examination small lumps were noticed in some of the bags. The CDPO (child and women development project officer) of Sindkheda project pointed by that the Federation did not inform the CDPO prior to or after the distribution of Sukhada in his block. Hence he is unaware of the stock position in various anganwadis of his block. Formation of lumps in a bag in each of two anganwadis of salwa was noticed. Six bags were stated to have been spoiled due to leakage of water in Sonshelu Anganwadi.

At the anganawadi of virdel, 118 units of sukhada are distributed among the beneficiaries. The daily distribution

is 8.85 kgs. The supply is reported to be regular and no complaint has been recorded about the quality. The product is stored in gram panchayat building. The stacking is done directly on the floor. The anganawadi of Babhulde village in Shirpur taluka of Dhule district was visited on 29th July 1992. Thirteen bags were stored directly on the floor plastered with mud; oil stains were visible on the floor where bags were stacked earlier. Rat burrows were noticed nearby and spoilage of Sukhada due to rats was evident. Storage condition was considered highly unsatisfactory. Also glasses and plates were not provided by ICDS. However, the supply appears to be regular and the product accepted by the beneficiary without any resistance. Overstocking was observed though only 8.5 kgs of Sukhada are distributed to the beneficiaries consisting of 63 children including two under nourished and 21 women. Samples were drawn for analysis.

There are 120 children including one under-nourished and 29 women in the anganwadi of Savalde village in Sindkheda taluk of Dhule district. 13.8 kgs of Sukhada are distributed among the beneficiaries daily. About 7 bags of Sukhada were stored on MS table. Rat burrows were noticed nearby and some bags were foundto be spoiled by rats. There does not appear to be any complaints regarding the quality of the product and the supply is reported to be regular.

In the anganawadi of Malapur village in Shirpur taluka of Dhule district, 152 units of Sukhada are distributed to

the beneficiaries consisting of 84 children and 29 women at the rate of 11.4 kgs per day. Supply was generally regular although there were some specific instances of shortage. Samples were taken for analysis.

The anganwadi of Hisale village in Shirpur taluka of Dhule district has 69 children including 7 under nourished children, 24 pregnant and lactating women. Ten kgs of Sukhada are distributed among the beneficiaries. There is a regular supply of Sukhada which is stored on wooden platform purchased by the anganwadi worker.

H-2 Jalgaon District

The CFTRI experts visited the anganwadis of Jalgoan district from 30th July 92 to 1st Aug 92. Two anganawadis are run in a room provided by Gram Panchayat of Chunchale village in Chopda taluka of Jalgaon district. There are 117 beneficiaries for whom 10 kgs of wheat based purak ahar (WSF) are distributed. Storage of WSF is on MS platform provided by the ICDS Dept. Supply of WSF was reported to be inadequate and irregular. There was no supply at all during the past several months. At the time of visit, only 12 kgs were the balance in stock. It was mentioned that while they have no complaints about quality, many felt the was montonous. Samples were drawn for analysis.

120 children of the 1st std of the primary school of Chunchale village get boiled cow's milk. About 18 litres of

milk supplied by the Vittkal co-operative milk society, Chunchale are distributed among the children daily. In the anganawadi of Mamalde village in Chopda taluka of Jalgaon district, 69 beneficiaries get 6 kgs of wheat based purak ahar (WSF) for daily distribution. 175 kgs of WSF, stored properly on MS Platform provided by ICDS dept, was the balance in stock at the time of the visit. Due to exhaustion of stock, there was no distribution for some time in the past. There was no complaint about the quality of the product as per the worker. But according to the village Sarpanch many beneficiaries do no like the product. Samples were drawn for analysis.

For the 70 beneficiaries of the 1st standard of the Marathi primary school of Mamalda village in Chopda taluka of Jalagoan district, 10.5 litres of cow's milk are distributed daily. The milk is being supplied by the Utkarsh Co-operative milk society of the village and it is understood that the scheme is operating satisfactorily. Utkarsh Co-operative Milk Society supplies milk to the Urdu Primary School also. At the time of the visit a consignment of 1.5 litres of milk was brought but it was shocking to see a dirty condition and housefly was visible in it. There was no punctuality among the students and average attendance was only 36 out of 64. Maintenance of the premises was found to awful and the atmosphere not very conducive to teaching.

The anganwadi in Aner village of Chopda taluka in Jalgaon district is run in an open space. 9.3 kgs of purak ahar (WSF) are distributed among the 89 beneficiaries. Due to non-availability at times it was not distributed on several occasions. The records showed that the supply by the Federation is also irregular. The seepage of water causes spoilage of the product, due to bad storage conditions.

There are 60 beneficiaries in the anganwadi of Hated village of Chopda taluka of Jalgaon district. The daily distribution is 6 kgs. 163 kgs were stored on MS platform provided by ICDS Dept. The quality of the product in some bags was found to be bad. Pronounced off flavour had developed, fungal growth was visible and lumps had formed. The taste of the product also was bad and many beneficiaries showed dislike for the product. Some parents even do not allow their children to eat the food due to fear of dysentry.

Another anganwadi is housed in an RCC building of gram panchayat. Spoilage of food by rats was noticed. There are 63 beneficiaries, who get 5 kg of purak ahar (WSF) to be distributed daily. 204 kg of ahar were stored on MS platform provided by ICDS dept. some bags were rejected due to off flavour development, cake formation and fungal growth. Supply is some what irregular. There were frequent complaints of insect infestation also. Many children do not want the same this monotonous taste to continue every day.

The anganawadi of Vele village of Chopda taluka has 67 beneficiaries. 5.25 kg of purak ahar (WSF) is distributed daily. The storage of 125 kg of purak ahar on MS platform was satisfactory. The supply was reported be irregular. Samples were drawn for analysis.

41 beneficiaries in the anganawadi of Akhatwade village in Chopda district get 3.825 kg of wheat based purak ahar (WSF) daily. Plates are provided for consumption of food. 376 kg of purak ahar was stored on the MS platform in the RCC constructed building. Some bags of previous supply were rejected because of spoilage due to insect infestation. Over stocking was observed. There are 239 children in the primary school of Vele-Akhatwade in Chopda taluk Wheat based paushtik ahar (WSF) is distributed to the beneficiaries who expressed their feelings about the taste of the product as monotonous. Sample was drawn for anaysis.

The anganwadi of Nimgavan village in Chopda taluk is run in a school class room. 6 kgs of wheat based purak ahar (WSF) is distributed to 66 beneficiaries. 228 kgs of ahar was stored on MS platform. Once 8 kgs were spoiled due to insect infestation. Overstocking was reported sometimes due to the supply of extra quantity of ahar delivered by the Federation. The anganwadi of Sukheda village is run in an old building which is in a dilapidated condition. 94 beneficiaries recieve 6.25 kg of ahar per day. 145 kg of ahar was the balance in stock at the time of visit. Sample

was collected for evaluation. Another anganwadi run in the village has 98 beneficieries with a daily consumption of 8.325 kgs. of ahar. 153 kgs of ahar were in stock.

In the primary school of the village, milk was being supplied last year. At present neither the milk nor Paushtik ahar (WSF) is being supplied. Paushtik ahar (WSF) is being distributed to 84 beneficiaries of the Boy's primary school of patonda village in Amalner taluka. Sometimes ahar was not availalbe due to non-supply. 70 kgs of ahar was the balance in stock at the time of the visit. Students wanted a change due monotony of taste. Sample was drawn for analysis.

The Girl's primary school of Patonda village has 74 beneficiaries. Only 70 g of ahar was distributed. Here again the students do not seem to like it as according to them it is monotonous to eat. The lumps were seen in some of the bags. Samples were drawn for analysis.

Three more anganwadis in the same village were visited on the same day. Purak ahar (WSF) is distributed to the beneficiaries. The ahar is stored on MS platform. Plastic plates are used for serving the food. The supply was reported to be regular. Samples were drawn for analysis.

At the primary school of Fupnagari village in Jalgaon taluka, the 1st Standard students got a total of 540 litres of milk distributed from August to October. In March 92, 100 kgs of Paushtik ahar (WSF) was distributed to students of 1st

to IVth standard . In 1992-93, neither of the two schemes appears to be in operation.

According to the deputy CEO (child and women welfare) Jalgaon district, the distribution of wheat based supplementary food is applicable to only 5 talukas of the district viz Amalner, Chopda, Bhadgaon, Parola and Chalisgaon. Some more talukas are likely to be covered under ICDS in the near future. In June 1992, 1550 kgs of food in 62 bags were distributed to velode and chopda taluka 16 bags, Hated (Badruk) in Chopda taluka 44 bags and Galwade & Amalner taluka 2 bags were found to have been spoiled and rejected.

Purak ahar (WSF) was available for distribution in Anganwadis of Karvankheda and vardi. In one instance 4 bags of purak ahar (WSF) were delivered to a relative of the anaganwadi worker of Amalde in Badgaon taluka on 30.5.92 and acknowledgement was taken for 5 bags.

Information was collected from District Educational Officers on the targets and achievements of the wheat based paushtik ahar in schools of the district (Table 6). It is clear that the supply is irregular and short of the target. The taste was described as monotonous. Periodic change in product profile was being sought by the beneficiaries.

As per the version of the District Marketing Officer of the Federation in many cases, responsible persons are not available on the spot for receiving the material at the time

of delivery of the food and this often creates scarcity in some of the centres.

The godown of the Federation was visited on the same day. Seven tonnes of purak ahar (WSF) was stored there by stacking over bamboo mats spread over the cemented floor. The go down is of RCC construction, well ventilated and clean.

I. Visit to some beneficiary centres in Sangli and Satara Districts

As a part of the project, CFTRI experts also visited several consumption centres in Sangli and Satara Districts to assess the field vis-a-vis the programme.

I-1. Sangli district

According to Dy. CEO, sangli, ICDS scheme is applicable to 3 talukas only i.e., Miraj, Khanapur and Kavathemahankal. The supplies were irregular at time and the beneficiaries do not find in taste of WSF satisfactory. DPO, Miraj reported that supplies are regular but often indents for full truck load is being insisted on by the Federation. The Education Dept. of Miraj taluka has no complaint about the delivery as well as quality of the product.

In the Anganawadi, Savali in Miraj taluka, boiled eggs are supplied to non-vegetarians and purak ahar (WSF) to vegetarians. In the normal course. 80 eggs and 2.375 kg of purak ahar (WSF) are distributed daily. When eggs are not

available, 8.775 kg of purak ahar (WSF) are supplied to all the beneficiaries.

Due to rodent problem in the gram panchayat building, ahar is stored on the wooden platform at the worker's residence. Boiled eggs are supplied by the Khanapur Taluk Co-operative poultry farm, kadagaon. There was no complaint regarding the quality of egg or ahar. However, cracks were noticed on eggs such win some casesat the time of visit. About 52 kg of purak ahar (WSF) the balance in stock.

At the primary school, Savali, six kgs of paushtik ahar (WSF) are distributed to sixty beneficiaries of I standard. The distribution of food started in the month of July. and would continue at the rate of 20 days in a month only eventhough the product is available. This is in accordance with the standing instruction given by the Dept. of Education, Miraj. Supplies were reported to be irregular. 160 kgs were supplied on 25.6.92 and 100 kgs were supplied on 4.8.92.

There was a dispute on payment for having exceeded the distribution of milk beyond 20 days in a month in a school in Koregaon of Walwe Taluka belonging to Sangli district.

The beneficiaries of Anganawadi, Tanang would get 65 boiled eggs and 450 g of purak ahar (WSF) daily. If eggs are not available, 6.825 kg of purak ahar (WSF) would be distributed. Rodent problem and water leakage during monsoon

are some of the problems of the building in which anganawadi is run.

The previous supply of purak ahar (WSF) was on 24.4.92. Some eggs supplied were found to be damaged and in a few cases shells were crushed exposing albumen inside. Many eggs kept in trays were having cracks at the lower side when inspected individually. It seems the eggs were intentionally placed in such a way to conceal the cracked portions of the eggs during inspection. Some parents do not allow their children to consume paushtik ahar (WSF) out of fear of dysentry.

Sixty children of primary school, Tanang, get Paushtik ahar (WSF). Ahar is stored in MS drums, which belonged to a teacher to avoid spoilage due to water seepage and rodent problem. Complaints like bitter taste, coarseness of material, under toasting etc are some times received.

In primary school kalambi, 7.5 litres of boiled cow's milk are distributed to 50 beneficiaries. The distribution is for ten days in a fortnight.

At the egg boiling centre, Kalambi, 12500 eggs are boiled everyday in two vessels in about 6 hrs. The boiled eggs are to be screened. Only sound ones are to be despatched. About 600 are reported to be rejected prior to despatch and another 100 during are said to be returned due to detection of damage prior to delivery.

It is learnt from CDPO, Kavathemahankal that purak ahar (WSF) is being distributed to the beneficiaries in the anganawadies of the block in which boiled egg was distributed previously. This has created some dissatisfaction amongst the beneficiaries. Supply of ahar is generally regular. But indents for full truck load or multiples are insisted on by the Federation. Some anganawadies do not have proper housing facilities. and lump formation was noticed in one of the bags supplied by satara factory on 29.6.92 in an Anganwadi of Kongholi.

Anganwadi of Nangole does not have adequate storage facility and Rodent problem is severe here Kavathemankal Anganawadi, besides, has rodent problem, lot of monkeys around to cope up with.

The anganawadi of alakud in Kavathemankal taluka has good building and it does not leak during monsoon. Purak ahar (WSF) is being distributed since 10.12.91. About 4.275 kg of ahar is being distributed everyday. There is no complaint about the quality of the product. In anganawadi of Deshing, about 3.25 kg of purak ahar (WSF) is distributed everyday. The product is stored on wooden platform. About 125 kg was the balance during the visit in stock. In another anganawadi, 2.25 kg is distributed. The building given by gram panchayat leaks during monsoon. Storage facilities are poor. Water seepage and lumpformation were noticed in one of the bags. In anganawadi of Kharsing, 7.5 kg is distributed daily. The building leaks during monsoon.

I-2. Satara District.

The ICDS scheme is applicable to two blocks viz. Dahiwadi (Man) and Vaduj (Khatav) in Satara District. Some anganawadi's of these blocks were visited.

According to CDPO, Dahiwadi, purak ahar (WSF) is being distributed to 140 anganawadis. On 25th/26th of every month, meeting is held with anganawadi workers to discuss about the stock position, indent for the following month, and distribution. The Federation is requested to send the product by 20th of everymonth and to provide a list of anganawadis after the distribution for verification. Supply in general is irregular in May and June and 17 anganawadi's did not get the food in last June. The insect infestation, lump formation/fungus growth are some of the problems noticed in the some food supplied to a few anganawadis.

In the anganawadi of Dahiwadi, 5.7 kg of purak ahar (WSF) is distributed and supply is regular. About 98 kg of food was in stock on the wooden table in the residence of a worker. In another anganawadi, purak ahar (WSF) was not distributed on several days during the period from 11.2.92 to 29.6.92. Some parents do not allow their children to consume the ahar fearing that it could cause dysentry.

Anganawadi of Moremala gets 3.075 kg of food for distribution. 39 kg of food stored in GI drum was the balance in stock. Some lumps were noticed in the food.

The primary school of Moremala was getting cow's milk for distribution among the children. After the recent food poisoning incident, suspecting cow's milk was the cause. this practice has been stopped. Instead, paushtik ahar (WSF) is now being distributed. The distribution has started recently.

In the primary school, wather in Karad taluka, Paushlik ahar (WSF) is distributed to 110 beneficiaries of Ist standard. 180 kg of paushtik ahar (WSF) was balance in stock them.

In primary school, Kuwe in Karad taluka, no suppl food distribution scheme is implemented.

In anganwadi, Kurle of Vaduj taluk, the building leaks during monsoon. Attendance is poor. About 4 kg of food is distributed. Some do not like to eat the food. However the supply is regular. In another anganawadi also, 4 kgs of food is distributed daily. Storage facility is very poor, Ten kgs of ahar was damaged by dogs.

At the primary school in Kurle, paushtik ahar (WSF) is distributed to 73 beneficiaries of the Ist standard. Sometimes, the supply is irregular. About 45 kgs were the left over stock. Due to typical taste and smell, the children hesitate to eat. It was learnt that at Girija Shankarawadi School, no paushtik ahar (WSF) has been supplied so far for 1992-93.

For children of the primary school, Trisesavali in Vaduj taluk, cow's milk was distributed in 1991-92. This year, neither cow's milk nor paushtik ahar (WSF) has been distributed so far, although request has been made to supply ahar.

At the anganawadi in the same village, about 7 kg of purak ahar (WSF) is distributed daily. Ahar is sieved prior to distribution on the instruction of the supervisor as many children find it difficult to eat with high coarse bran.

In primary schools at palashi and Vanzoli in Vaduj taluka, ahar is distributed to 34 and 30 beneficiaries respectively daily though. Supply is reported to be irregular and spoilage by rodents was observed.

J. Visit to some of the anganwadis in Nagpur and Chandrapur districts

J-1. Nagpur district

Two anganwadis viz Metpanjra and Dharatwada in Katol block were visited. Metapanjra has 119 children and 19 pregnant and lactating women. Dharatwada has 135 beneficiaries including 110 children and 25 pregnant and lactating women.

The local food Kichri consisting of 70 gms of rice and 13 gms of mung dal is supplied to each of the beneficiary. Kichri is prepared by cooking the raw materials with salt and haldi. Cooking time is 1 hr. There is quality variation

from lot to lot. Storage is poor. Rodent menace was observed. Insect infestation was seen in the material stored for more than a month. Irregular supply was noticed.

There are 104 anganavadi in the Katol block having 8199 children and 1407 lactating and pregnant women as beneficiaries.

The Kamelshwar block has 91 anganwadis with 5424 beneficiaries. Lactating and pregnant women are 619.

Bahmni anganwadi is in Kamelshwar block. Purak ahar from satara factory is supplied to them, at the rate of 75 gms for each of the child and 150 gms for each of the women. The product is coarse powder having dull white colour. Taste varies from lot to lot. Rancidity and bitter taste are noticed. It is more if the product is stored for longer period. Sometimes, it is sent back to the distribution centre as there are no takers for it.

J-2. Chandrapur District

Karwa anganwadi belongs to Ballarshah circle near Chndrapur tribal villages. There are 20 beneficairies. Sukhada is supplied at the rate of 75 gms for each child and 150 gms for each mother and malnourised child. The product is acceptable. However when wheat based supplementary food (WSF) was once supplied, the beneficiaries refused to eat, as it was fibrous and bitter to taste.

Junona is another angawadi in the Ballarshah circle, having 90 beneficiaries. Sukhada is served and found acceptable. But wheat based supplementary food (WSF) is not acceptable.

The Gondpipri anganwadi in Gand pipri block has 83 beneficiaries. Sukhada is supplied and found acceptable. Bags are stored in stacked conditions. Damages due to rodent, cat, crow etc. occur and rancidity develops if stored for longer period. Purak ahar (WSF) food was not found acceptable due to mainly insect infestation.

There is one more anganawadi in Gondpipri which has 98 beneficiries. Sukhada is supplied here. The product is acceptable and there is no wastage. Purak ahar (WSF) supplied in April and May was not accepted due to bitter taste. Surakshanagar anganawadi in Bhadrawati block has 89 beneficiaries. Sukhada is supplied regularly. Product is acceptable and well stored. There are 110 beneficiaries in Hutatma Smarak anganawadi. Sukhada is supplied and acceptable. Product is stored in a tin container.

In Chandrapur block, there are 133 anganwadies. The beneficiaries include 1319 pregnant women, 899 nursing mothers, and 12939 children ranging from 6 months to 6 years. Supply is slightly short and irregular as noted below

	Requirement	Supply
April	941 bags	915 bags
May	937 bags	929 bags
June	869 bags	104 (shortage of raw materials)
July	1025 bags	1013

According to block education officer, Paushtik ahar (WSF) is supplied from satara unit to 106 schools with 19295 children. There is no regular supply and the product is not accepted due to bitter taste. Wastage due to rodent and cat was reported to be significant.

In Rajura block 15 circles with 322 anganwadis have 22713 beneficiaries. There are 2583 pregnant women, 2443 nursing mothers and 26201 children. Sukhada is supplied but short supply is reported.

There are 175 anganwadis in Gondpipri block. Pregnant women are 1267 and lactating mothers are 513 and number of children is 7,798. Sukhada is being supplied. When sukhada was not supplied, Purak ahar (WSF) is supplied which is not accepted due to bitter taste.

The Bhadravati block has 147 anganawadis. There are 10,939 beneficiaries. Some of the anganawadis are are not easily accessible. Consignments are carried to these anganawadis manually. Supply invariably is short and irregular.

The Zilla parishad primary school, Bhadravati received 220 bags of Paushtik ahar on 14.1.92. It has no faculty for storage. Bags were damaged due to rodent, cat and birds. Product was found unacceptable to the beneficiaries. There is no supply also since 14.1.92.

The Warora block has 160 anganawadis with a total number by 12085 beneficiaries. Sukhada is supplied but regularly.

The amount of the product distributed by volumetric measures by anganawadi workers were collected, packed in polythene bags, sealed and brought to the laboratory. The exact weight was recorded and given below.

Block	Name of anganwadi	Wt. recorded gm
Chandrapur	Karwa	67
Gondpipri	Code-1	70
	Code-4	91
Warora	Bhatala-1	72
	Bhatala-2	125
	Saoli-1	80
Bhadrawati	Hutatma	75
	Suraksnanagar	67

K. Report of the analyses of samples

Raw materials and finished products were collected from the manufacturing units as well as consumption centres. The results have been tabulated in tables from 7 to 20. Some of the salient observations have been made as noted below.

1. Sugar (Granular): The sample has been collected from the Bhivandi factory. It has 98.87% sucrose and 20.5 ppm of sulphur dioxide. But it has been found that sugar sample contains iron filings.

2. Bengal gram: Bengal gram sample was collected from Bhivandi factory on 23.7.92. Among the parameters assessed, the sample contains 11.60% of weevilled grains by count as against the PFA limit of 10.0% (Max) and 131.00 mg/kg of uric acid as against the Max. PFA limit of 100 mg/kg.)

3. Refined sun flower oil: This also has been collected from Bhivandi factory on 23.7.92. The acid value of the sample is 0.73 which is higher than the prescribed PFA limit of less than 0.5. Also the sample has become rancid, as indicated by Kries test. Hence the sample does not conform to the PFA specification.

4. Sukhada Purak Ahar: These samples also have been collected from Bhivandi factory. They have been analysed for different parameters like proteins, fat, crude fibre etc, while Sakhada has 0.66% crude fibre, purak ahar has 3.21%. This indicates

that fibre content in purak ahar (WSF) is five times higher than Sukhada.

5. CSB supplementary food: The sample has been collected from different anganawadis such as Pangri, Vavi and Kolgoan. The protein and fat contents are 9.97 & 14.30%, 10.22 & 13.52% and 10.55 & 13.26% respectively indicating the variations in the important constitutents.

Table 1: Growth rate of children: Some guidelines for monitoring

Age of Child	Weight of child in Nutrition grade in Kgs.				
	Normal	Grade I	Grade II	Grade III	Grade IV
At birth	> 2.8	2.4-2.8	2.0-2.4	1.6-2.0	<1.6
1 Year	> 7.8	6.9-7.8	6.0-6.9	4.9-6.0	<4.9
2 Years	> 10.0	8.7-10.0	7.0-8.7	6.2-7.0	<6.2
3 Years	> 11.1	10.2-11.1	8.7-10.2	7.2-8.7	<7.2
4 Years	> 13.2	11.5-13.2	9.8-11.5	8.2-9.8	<8.2
5 Years	> 14.7	12.8-14.7	11.0-12.8	9.2-11.0	<9.2

Grade I - Give instructions to parent of child
Grade II - Feed to be given in Anganwadi
Grade III - Highly undernourished (double dose of Sukhda to be given per day).

Table 2: Wheat based paushtik ahar distribution in Nasik district (1991-92)
(under school feeding programme of State govt.)

Taluka	Beneficiaries Monthly	Target supply			Month wise distribution (Bags)									Annual bags	supply Tonnes	% Achievement of target
		Monthly bags	Annual bags	Tonne	July	Aug	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.			
Dindori	6806	1331	13310	133.1	976	1299	-	1662	-	1450	204	1000	-	6591	65.91	49.51
Nandgaon	4753	931	9310	93.1	-	-	-	186	-	-	-	288	-	474	4.74	5.09
Malegaon	11134	2223	22230	222.3	-	-	-	1533	-	-	-	-	-	1533	15.33	6.89
Yeola	7336	1270	12700	127.0	-	-	-	399	-	-	-	-	-	399	3.99	3.14
Surgana	10234	2065	20650	206.5	600	1023	1990	1918	-	2096	-	1918	-	9545	95.45	46.22
Sinnar	7669	1493	14930	149.3	701	848	-	1582	-	-	-	-	-	3131	31.31	20.97
Nasik	5184	1011	10110	101.1	230	525	496	371	-	1131	-	1097	-	3850	38.50	38.08
Igatpuri	9182	1644	16440	164.4	819	1098	-	-	-	1235	1098	490	-	4740	47.40	28.83
Niphad	6591	1304	13040	130.4	-	-	-	530	-	-	-	-	-	530	5.30	4.06
Baglan	8702	1677	16770	167.7	-	-	704	-	-	-	-	721	-	1425	14.25	8.49
Peth	7326	1429	14290	142.9	-	-	898	1246	-	1000	-	-	-	3144	31.44	22.00
Kalvan	6756	1332	13320	133.2	-	-	118	718	-	-	-	-	-	836	8.36	6.27
Chandvad	5525	1108	11080	110.8	-	-	-	374	-	-	-	-	-	374	3.74	3.37
Total	96198	18788	187880	1878.8	3326	4793	4206	10519	-	6912	1302	5514	-	36572	365.72	19.47

Table 3: Distribution of Wheat Based Paushtik Ahar (under school feeding programme) in Dhule District in 1991-92

Block/Taluks	Bene-ficiaries (Monthly)	Target supply			Month wise Distribution									Annual distribution		% Target Achievement
		Monthly Bags	Annual (10kg.)	Tonnes	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Bags	Tonnes	
Nandurbar		878	8780	87.8	-	-	470	258	-	100	-	116	115	1059	10.59	12.06
Sakri		2243	22430	224.3	1400	2395	2284	-	-	1699	403	2154	2109	12444	124.44	55.48
Shirpur		934	9340	93.4	232	263	873	280	-	568	213	428	410	3267	32.67	34.98
Navapur		2633	26330	263.3	-	1107	2399	1638	-	2956	2993	2392	1080	14565	145.65	55.32
Dhule		624	6240	62.4	-	-	245	-	-	-	-	-	-	245	2.45	3.93
Shindkheda		221	2210	22.1	140	-	264	-	-	47	-	-	-	451	4.51	20.41
Dhadgaon		1098	10980	109.8	-	-	1136	801	-	1003	800	1359	-	5059	50.59	46.52
Taloga		1303	13030	130.3	514	506	1362	578	-	1298	200	708	-	5166	51.66	39.65
Shahada		1690	16900	169.0	-	317	1681	400	-	1101	-	830	-	4329	43.29	25.62
Akkalkna		1767	17670	176.7	801	907	810	912	-	805	448	113	-	4796	47.96	27.14
Total		13389	133890	1338.9	3087	5495	11524	4867	-	9577	5057	8100	3714	51421	514.21	38.42

(Source: DMO Office, Dhule)

Table 4: Samples of supplementary food drawn from schools, Anganwadis (S-school A-Anganwadi) collected for analysis

Sl. No.		Sample type	Source	Mfg date	Sampling date
1.	1001	CSB based Sukhda	MSCMF Dhule godown	24.7.92	27.7.92
2.	1002	Wheat based purak ahar	MSCMF Dhule godown	25.7.92	27.7.92
3.	1003	CSB-Sukhda	A-Vikharan (Dhule)	16.6.92	28.7.92
4.	1004	CSB-Sukhda	A-Chimthane (Dhule)	23.4.92	28.7.92
5.	1005	CSB-Sukhda	A-Chimthane (Dhule)	14.6.92	28.7.92
6.	1006	CSB-Sukhda	A-Malapur (Dhule)	21.7.92	29.7.92
7.	1007	CSB-Sukhda	A-Hisale (Dhule)	2.6.92	29.7.92
8.	1008	CSB-Sukhda	A-Babhulde	28.5.92	29.7.92
9.	1009	Wheat based purak Ahar	A-Chunchale (Jalgaon)	-	30.7.92
10.	1010	-do-	A-Nimgavan (Jalgaon)	17.7.92	30.7.92
11.	1011	-do-	A-Hated (Jalgaon)	8.6.92	30.7.92
12.	1012	-do-	A-Hated (Jalgaon)	23.7.92	30.7.92
13.	1013	-do-	A-Mamalde (Jalgaon)	25.7.92	30.7.92
14.	1014	-do-	A-Vele (Jalgaon)	-	30.7.92
15.	1015	-do-	A-Akhatwade (Jalgaon)	-	30.7.92
16.	1016	Wheat based paushtik Ahar	S-Vele (Jalgaon)	14.7.92	30.7.92
17.	1017	-do-	S-Patonda (Jalgaon) Boys	16.7.92	31.7.92
18.	1018	-do-	S-Patonda (Jalgaon) Girls	16.7.92	31.7.92
19.	1019	Wheat based purak Ahar	A-Saukheda (Jalgaon)	18.7.92	31.7.92
20.	1020	-do-	A-Pantonda(145) (Jalgaon)	18.7.92	31.7.92
21.	1021	-do-	A-Patonda(146) (Jalgaon)	18.7.92	31.7.92
22.	1022	Wheat based paushtik Ahar	S-Patonda (girls) (Jalgaon)	6.7.92	31.7.92

Table-5: Status of School Feeding Programme in some schools of Sindkheda block:

School of village	Beneficiaries	1991-92	July 1992
Kurrukwade	70	No milk supply by dairy	No Milk supply by dairy yet
Bramhane	-	- do -	- do -
New Kodade	-	- do -	- do -
Langhane	-	- do -	- do -
Lohgaon	72	- do -	- do -
Dhamane	-	- do -	- do -
Vasamane	46	No Paushtik ahar supply	No Paushtik ahar supply yet
Old Kodade	-	- do -	- do -
Kumbhare	58	Only 60 Kg. Paushtik Ahar supply in Oct., 1991	- do -
Kalgaon	45	Only 30 Kg. Paushtik Ahar supply in Oct., 1991.	- do -

Table 6: Wheat based Paushtik ahar distribution in Jalgaon district (1991-92) (under school feeding programme of state Government)

Taluka	Bene-ficiaries (Monthly)	Target supply			Month wise supply (10 Kg. Bags) 1991-92									Total Bags	Tonnes	% Target Achieved
		Monthly Bags	Annual (10kg.)	Tonnes	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.			
Amalner	5953	1200	12000	120.0	-	390	748	596	546	93	306	648	145	3472	34.72	28.93
Bhusaval	2467	497	4970	49.7	425	285	276	282	255	-	269	257	240	2289	22.89	46.06
Bhadgaon	3114	625	6250	62.5	-	563	640	458	890	304	713	606	301	4475	44.75	71.60
Chalisgaon	3103	650	6500	65.0	348	653	762	176	344	554	631	282	-	3750	37.50	57.69
Chopda	4706	947	9470	94.7	450	650	650	159	495	353	398	750	600	4905	49.05	51.80
Edlabad	2949	594	5940	59.4	400	432	475	174	189	-	550	317	-	2537	25.37	42.71
Erandol	7552	1500	15000	150.0	791	553	847	1046	-	896	476	1311	602	6522	65.22	43.48
Jamner	6672	1300	13000	130.0	-	594	819	631	599	-	439	625	958	4665	46.65	35.99
Jalgaon	4620	939	9390	93.9	592	743	752	663	288	848	866	923	936	6611	66.11	70.40
Pachora	2879	600	6000	60.0	-	229	324	441	-	501	392	553	240	2680	26.80	44.67
Parola	5179	1038	10380	103.8	268	398	1003	607	364	250	396	1209	350	5140	51.40	49.52
Raver	4518	900	9000	90.0	-	284	365	27	-	-	83	-	-	759	7.59	8.43
Yaval	4892	947	9470	94.7	349	407	696	325	467	444	484	223	-	3395	33.95	35.85
Total	58604	11737	117370	1173.7	3623	6181	8354	5585	4437	4243	6003	7704	4372	50502	505.02	43.03

(Source: Education Dept; Z.P. Jalgaon)

Table-7: The physical characteristics of uncleaned wheat

Sl.No.	Analysis	Result
	Physical appearance	Wheat sample free from insect infestation
1.	Moisture %	10.1
2.	Foreign matter %	2.06
	a) Inorganic matter %	0.73
	b) Poisonous seeds %	Nil
3.	Other edible grains %	Nil
4.	Damaged grains %	2.77
5.	Weevilled grains %	2.9
6.	Uric acid mgs/kg	64
7.	Mycotoxin, mcgs/kg	Nil
8.	Total of foreign matter + other edible grain + damaged grains	4.83
9.	Pesticide residues	Nil

Table-8: The physical characteristics of cleaned wheat

Sl.No.	Analysis	Result
	Physical appearance	Wheat sample free from insect infestation
1.	Moisture %	8.23
2.	Foreign matter %	0.12
	a) Inorganic matter %	Nil
	b) Poisonous seeds %	Nil
3.	Other edible grains %	Nil
4.	Damaged grains %	2.09
5.	Weevilled grains %	1.76
6.	Uric acid mgs/kg	32
7.	Mycotoxin, mcgs/kg	Nil
8.	Total of foreign matter + other edible grain + damaged grains	2.12.
9.	Pesticide residues	Nil

Table-9: Physico-chemical characteristics of milled wheat

Sl.No.	Analysis	Result
	Physical appearance	Wheat sample free from insect infestation
1.	Moisture %	11.7
2.	Total ash % on dry wt.	1.71
3.	Ash insoluble in dilute HCl % on dry wt.	0.1
4.	Gluten % on dry wt.	9.38
5.	Alcoholic acidity % (with 90% alcohol)	0.22
6.	Rodent hair and excreta	Nil
7.	Uric acid, mgs/100gm	3.2
8.	Added artificial colouring matter	Nil
9.	Iron filings	Nil
10.	Microscopic examination	Revealed the presence of wheat starch only

Table 10: Proximate composition of Nutritional supplementary foods (Bhiwandi)

Sl.No.	Analysis	Sukhada	WSF
1.	Moisture %	7.28	7.98
2.	Protein (Nx6.25)% W/W	10.11	9.34
3.	Fat % W/W	10.44	6.93
4.	Ash % W/W	2.73	1.71
5.	Crude fibre % W/W	0.66	3.21
6.	Carbohydrate by difference % W/W	68.78	70.83
7.	Calorific value K.Cal /100gm	409.52	383.05

*WSF - Purak Ahar/Paushtik Ahar

Table 11: Proximate composition of Sukhada (Pangri, Vair and Kolgaon.

Sl.No.	Analysis	Result		
		Pangri	Vavi	Kolgaon
1.	Moisture %	6.59	6.17	3.84
2.	Protein (Nx6.25)% W/W	9.97	10.22	10.55
3.	Fat % W/W	14.30	13.52	13.26
4.	Ash % W/W	3.20	3.19	2.83
5.	Crude fibre % W/W	0.83	0.80	0.76
6.	Ash insoluble in HCL% W/W	0.10	0.09	0.17
7.	Carbohydrate by difference % W/W	65.12	66.10	68.76
8.	Calorific value K.Cal /100gm	429.06	426.96	437.00

Table 12: Proximate composition of Sukhada (Pathre, Vilholi and Raigad.

Sl.No.	Analysis	Result		
		Pathre	Vilholi	Raigad
1.	Moisture %	6.74	6.90	6.61
2.	Protein (Nx6.25)% W/W	11.61	11.75	9.98
3.	Fat % W/W	14.13	13.85	14.40
4.	Ash % W/W	2.78	2.91	3.23
5.	Crude fibre % W/W	0.89	0.91	0.90
6.	Ash insoluble in HCL% W/W	traces	traces	0.08
7.	Carbohydrate by difference % W/W	63.85	63.68	64.88
8.	Calorific value K.Cal /100gm	429	425	429.04

Table 13: Analysis of milled Bengal gram flour & Soya flour

Sl.No.	Analysis	Result		
		Milled Bengalgram	Soya flour (General)	Soya flour (SR foods)
1.	Moisture %	9.92	8.90	11.30
2.	Total ash %	3.42	6.06	6.22
3.	Ash insoluble in dilute HCL % on dry wt.	0.37	0.19	0.27
4.	Protein % (Nx6.25)	18.0	49.60	48.70

Table 14: The physical characteristics of bengalgram

Sl.No.	Parameters	Result
1.	Moisture %	9.18
2.	Foreign matter	0.38
	a) Inorganic matter % by wt	0.33
3.	Other edible grains % by wt. (Soya dhal)	0.29
4.	Damaged grains % by wt	1.50
5.	Weevilled grains % (by count)	11.60
6.	Uric acid mg/kg	131.00
7.	Aflatoxin, mcgs/kg	Nil
8.	Pesticide residue	Nil
9.	Total foreign matter, other edible grain & damaged grains %	2.17

Table 15: Analysis of refined sunflower oil.

Sl.No	Analysis	Result
1.	Butyro-refractometer reading at 40°C	62.0
2.	Iodine value	129.2
3.	Saponification value	191.1
4.	Acid value	0.73
5.	Moisture % by wt. for refined oil	0.07
6.	Qualitative tests:	
a.	Kreis test for rancidity	+ve
b.	HCL test for added colouring matter	-ve
c.	TLC test for mineral oil	-ve
d.	TLC test for castor oil	-ve
e.	Boudouin test for sesame oil	-ve
f.	Halphens test for cottonseed oil	-ve
g.	Hexabromide test for linseed oil	-ve
h.	Test for presence of argemone oil by TLC	-ve
i.	Test for TCP by TLC	-ve
j.	Flash point for refined oil	Couldn't be seen till 250°C

Table 16: Analysis of refined soyabean oil.

Sl.No	Analysis	Result
1.	Butyro-refractometer reading at 40°C	61.5
2.	Iodine value	132.8
3.	Saponification value	192.5
4.	Acid Value	0.24
5.	Moisture % by wt. for refined oil	0.08
6.	Phosphorus	Nil
7.	Qualitative tests:	
a.	Kreis test for rancidity	-ve
b.	HCL test for added colouring matter	-ve
c.	TLC test for mineral oil	-ve
d.	TLC test for castor oil	-ve
e.	Boudouin test for sesame oil	-ve
f.	Halphens test for cottonseed oil	-ve
g.	Hexabromide test for linseed oil	-ve
h.	Test for presence of argemone oil by TLC	-ve
i.	Test for TCP by TLC	-ve
j.	Flash point for refined oil	Couldn't be seen till 250°C

Table 17: Physico-chemical characteristics of sugar.

Sl.No.	Analysis	Result
	Physical appearance	White crystalline product
1.	Moisture %	0.083
2.	Total ash % on dry wt.	0.042
3.	Sucrose % W/W	98.87
4.	Test for the presence iron fillings	Positive
5.	sulphur dioxide (ppm)	20.5
6.	Reducing sugar % W/W	Nil

Table 18: Proximate composition of corn soya blend.

Sl.No.	Analysis	Result
1.	Moisture %	10.6
2.	Total ash %	1.3
3.	Ash insoulble in dilute HCL % on dry wt.	0.3
4.	Protein %	15.5
5.	Fat %	5.2
6.	Crude fibre %	1.12
7.	Carbohydrate by difference %	66.3
8.	Calorific value K.Cal /100gm	374.0

Table 19 : Protein Efficiency Ratio of Sukhada and Wheat Based Supplementary Food (WSF) supplied by Maharastra Cooperative Marketing Federation

Sample	PER
Sukhada*	2.82
WSF*	2.36
Skim Milk Powder	3.13

* Fed to animals after fortifying with Vitamins and Minerals. Further studies are in progress with field samples and growth promoting values of the formulation

Table 20: Microbiological profile of Sukhada and WSF supplied by the Federation

Parameters	Sukhada*	WSF*
Standard plate Count	87,000/gm	9000/gm
Coliform Count	1,200/gm	50/gm
E. coli	Nil	Nil
Salmonella	Nil	Nil

* Further studies with feed samples in progress

ANNEXURE-II

SPECIFICATION FOR FOOD SUPPLEMENTS FOR CHILDREN (IS: 7021-1973)

0.1 This Indian Standard was adopted for the Indian Standards Institution on 20 July 1973, after the draft finalized by the Nutrition Sectional Committee had been approved by the Agricultural and Food Products Division Council.

0.2 Since the supply of milk proteins in the country is limited, considerable efforts are being made to utilize vegetable proteins to fight protein malnutrition. Consequently, a number of protein-rich foods are now being marketed. It has, therefore, become necessary to prescribe minimum requirements for protein-rich foods, for which a series of standards is being compiled. These standards are expected to help in optimum utilization of edible oilseed flours, guide the manufacturers in formulating their products, and ensure desired performance levels for consumers.

0.2.1 This standard, which is the first in the series, prescribes specifications for protein-rich food supplements for infants and preschool children between 18 months and 5 years of age. The committee responsible for preparing this standard felt that the time was now opportune to have standards based on quality evaluation of protein; furthermore, the nutrients in food supplements for infants

and preschool children are practically the same, though the form in which they are produced, might differ.

0.2.2 This standard does not define any particular composition of protein-rich food supplements for infants and preschool children. With a view to encouraging new formulations for these food supplements, this standard specifies only the minimum level of nutrients in the end product and the quality of protein. The levels of nutrients, it was felt, should be such as to meet at least one-third of the daily requirments of a weaned child regarding protein and calories, while meeting the entire daily requirements of vitamins in 100 g of the food.

0.3 While formulating this standard, necessary consideration has been given to the relevant rules prescribed by the Government of India, under the Prevention of Food Adulteration Act, 1954. This standard is subject to restrictions imposed under the Act and the Rules framed thereunder, wherever applicable.

0.4 For the purpose of deciding whether a particular requirment of this standards is compiled with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS: 2-1960. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. Scope

1.1 This standard prescribed the requirments and the methods of sampling and tests for protein-rich food supplements for infants and preschool children between 18 months and 5 years of age.

2. Terminology

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Type Tests - These tests are (see 3.2) to prove the conformity to the requirments of this standard. They are intended to approve the formulation and quality of the product at least in the beginning of marketing and/or certification. These tests may also be conducted periodically to supplement the rountine tests or whenever the basic formula is changed.

2.2 Routine Tests - These tests (see 3.3) are carried out on each lot to check the essential requirments that are likely to vary during production.

3. Requirements

3.1 Raw Materials - Raw materials and other ingredients used in the manufacture of protein-rich food supplements for infants and preschool children shall be of good quality. In particular edible oilseed flour(s), if used, shall conform to

the following standards:

a. Groundnut flour - IS: 4684-1968 or IS: 4875-1968

b. Cottonseed flour - IS: 4874-1968 or IS: 4876-1968

c. Soya flour - IS: 5275-1969 or IS: 5276-1969

3.1.1 Conditions of Manufacture - The protein-rich food supplements for infants and preschool children shall be manufactured, packed, stored and distributed in premises maintained under hygienic conditions. (see IS: 2491-1972).

3.2 Type Tests

3.2.1 Protein - The levels and quality of proteins in protein-rich foods for infants and children shall be:

a. 15 percent minimum protein with a Protein Efficiency Ratio (PER) of 2.0, or

b. 20 percent minimum protein with a protein Efficiency Ratio (PER) of 1.75.

3.2.2 Aflatoxin - The protein-rich food supplements for infants and preschool children shall not have an aflatoxin content more than 30 ug/kg (mcg) of the food.

3.2.3 Gossypol - The protien-rich food supplements for infants and preschool children shall not have free gossypol content more than 0.065 percent by mass and total gossypol content more than 1.10 percent by mass.

3.2.4 Urease Activity - The protein-rich food supplements for infants and preschool children shall not show a change in pH

by more than 1.0. Aflatoxin content, gossypol content and urease activity shall be determined only if flours of groundnut, cottonseed and soya respectively have been added to the protein-rich food supplements for infants and preschool children.

3.2.5 The protein-rich food supplements for infants and preschool children shall also comply with the requirements given in table.1.

IS: 7021-1973

Table 1 : Vitamin Requirements per 100 Grams

(Clause 3.2.5)

Sl. No.	Characteristic	Requirement
i.	Vitamin A, mcg, Min	200
ii.	Vitamin D, mcg, Min	3.5
iii.	Thiamine, mg, Min	0.5
iv.	Riboflavin, mg, Min	0.5
v.	Nicotinic acid, mg, Min	5
vi.	Calcium, mg, Min	300
vii.	Iron, mg, Min	12
viii.	Vitamin B_{12}, mcg, Min	0.5
ix.	Folic acid, mcg, Min	50
x.	Ascorbic acid, mg, Min	30

3.3 Routine Tests

3.3.1 Description - The protein-rich food supplements for infants and preschool children shall be uniform, that is reasonably free from lumps and brown or black specks. They shall also be free from extraneous matter, harmful material and bacteria.

3.3.2 Flavour - The flavour of the protein-rich food supplements for infants and preschool children in the dry condition or on reconstitution shall be fresh and pleasant. These food supplements shall not have a rancid taste or musty odour. Preservatives, flavours and edible colours permitted under the prevention of Food Adulteration Rules may be added.

3.3.3 The Product shall also conform to the requirements given in Table 2.

Table 2 : Requirements for routine tests

Sl. No.	Characteristic	Requirement
i.	Protien, percent by mass, Min	15 or 20
ii.	Moisture, percent by mass, Max	8.0
iii.	Fat, percent by mass, Max	7.5
iv.	Totalash, percent by mass, Max	7.5
v.	Acid insoluble ash, percent by mass, Max	0.05
vi.	Crude fibre (on dry basis), percent by mass, Max	1.0
vii.	Bacterial count per g, Max	50,000
viii.	Coliform count, per g, Max	10

3.4 Condition of Manufacture - The protein-rich food supplements for infants and preschool children shall be manufactured, packed, stored and distributed under hygienic conditions in licensed premises.

4. Packing and Marking

4.1 Packing - The protein-rich food supplements shall be packed in any moisture-proof, clean and sound containers in quantities of 200 g, 500 g or 1 kg, unless otherwise agreed to between the purchaser and the vendor in such a way as to protect it from deterioration.

4.2 Marking - The following particulars shall be marked or lebelled on each container:

a. Calories and protein per 100 grams;

b. Name of the material and the trade-name or brand-name, if any;

c. Name and address of the manufacturer;

d. Batch or code number;

e. Net mass; and

f. Directions for use and the percentage of the daily requirements of nutrients which the supplement provides.

5. Sampling

5.1. Representative samples of the material shall be drawn as prescribed in IS: 1547-1968.

ANNEXURE-III

CODE FOR HYGIENIC CONDITIONS FOR FOOD PROCESSING UNITS (IS: 2491-1972)

0. Foreword.

0.1 This Indian Standard was adopted by the Indian Standards Institutions on 28 April 1972, after the draft finalized by the Food Hygiene, Sampling and Analysis Sectional Committee had been approved by the agricultural and Food products Division Council.

0.2 For the purpose of this standard, a food manufacturing unit shall be an establishment in which raw food material is sorted, cleaned, processed and the final product stored for subsequent consumption by the public. Proper care in environmental and personal hygiene should be taken in such establishments in view of its importance in public health.

0.3 Consumers do not have the available knowledge or means for determining the hygienic quality of the food they purchase. For this, they rely on the various industries that prepare and handle foods. This code has been prepared keeping in view that unless the factory producing the food is governed by a hygienic code in respect of lay-out, plant and personnel, the quality of the food produced cannot be assumed to be safe.

0.3.1 It is, however, realised that it may be difficult to observe this code completely as regards the site and other requirements in the case of small factories or those already constructed or the existing factories already licensed and approved by the authorities. However, the basic principles of hygiene underlining the technical advice in this code should be applied with appropriate modifications to all food processing units.

0.4 This code covers only general requirements for any food processing unit and the individual units may have to meet additional requirements depending on their particular needs for handling different foods.

0.5 This code is subject to the provisions in Factories Act, 1948; the Prevention of Food Adulteration Act, 1954 and the rules framed thereunder; and the Fruit Products Order, 1955, amended up to date.

0.6 This code was first published in 1963 and is being revised to bring it up to date. In this revision, more emphasis has been laid on employee hygiene and raw material handling.

0.6.1 In the preparation of this code, considerable assistance has been derived from the "Recommended International Code of practice general principles of food hygiene" published by Joint FAO/WHO Food Standards programme Codex Alimentarius Commission, Rome, 1969.

1. Scope

1.1 This code prescribes the hygienic conditions required for establishing and maintaining a food processing unit.

2. Site

2.1 A food processing unit shall preferably be situated in an open, clean and healthy surroundings far away from road-side where lot of dust arises due to vehicular-traffic; garbage dumps; cattle sheds; open sewage drains or other places likely to breed flies. It shall be free from sources of obnoxious fumes, smoke, odours or excessive dust. There shall not be accumulation of trash, garbage or similar waste in the vicinity of the plant.

3. Building

3.1 The structure shall be of permanent nature and shall be suitable in size, construction and design to facilitate maintenance and hygienic operations for processing purposes. It should provide sufficient space for housing of equipment and storage of materials (raw as well as finished products) as is necessary for hygienic operations. The material of construction shall be of brick, plaster, cement, concrete, tile or any other equivalent materials which ensure cleanliness.

3.1.1 Construction of the building shall be such that it shall be rodent proof, flyproof and bird proof.

3.2 No portion of building shall be used for domestic purposes or other types of food preparatios unless separated

by suitable partitions or locations or other effective means so as to avoid contamination of the product with undesirable micro-organisms, odour, chemicals, filth or other foreign material.

3.3 Ventilation and Lighting - The food manufacturing unit shall be adequately lighted and ventilated keeping in view the number of workers, their hours of work and nature of operation. Ventilation and lighting shall also be in accordance with the Factories Act, 1948.

3.4 Floor - The floor shall be smooth, washable, properly sloped to gullies connected to sewers or drains. It shall be impervious to water and not affected by weak acids, alkalis or steam. Cemented floor shall be made for work room, store room and godown.

3.5 Walls and Ceilings - Internal walls and ceilings should have smooth, non-absorbent light-coloured surface, free from crevices and sharp angles, to facilitate their efficient cleaning. The junction of the floor with the walls and the junction between the two walls should be rounded to prevent accumulatin of dust.

3.6 Repairs - The building shall be maintained in a proper state of repair and cleanliness at all times. Whenever required, it may be lime washed, painted, disinfected, disinfested and deodorized.

3.7 Procesing Room - The room shall be made flyproof and rodentproof. The floor shall be impervious to water and shall have a sufficient slope to ensure adequate drainage. Drains in processing rooms shall be cemented and covered with detachable covers. Drains shall be kept clean and shall be provided with traps at suitable places before they are connected with the municipal drain to avoid blocking or choking, or in the absence of any such arrangement, they shall be drained in soakage pits situated at a suitable distance from the factory and also the source of water supply. Adequate facilities for washing the room shall be provided. Adequate number of wash basins and sinks shall be provided.

3.7.1 Preparation and Filling - Table tops shall be of such material as to be impervious to water. Other portions of the tables shall be free from corners, cracks and crevices. The same conditions shall apply to work benches and other furniture; these shall be inherently impervious to water.

3.7.2 Proper ventilation shall be maintained to prevent condensation and drippage. Exhaust fans shall be provided where necessary.

3.8 Raw Material Store Room - The rooms shall be made and maintained rodent-proof. They shall also be made free from dampness as far as possible. If articles to be stored are such as to attract flies, flyproofing shall be provided.

3.9 Packing and Storage Room - The packing and storage rooms shall be flyproof.

3.10 Waste Storage Room - Wherever possible, a separate room for storing inedible materials shall be provided in a location convenient to the various preparation and processing areas. This waste storage room shall be of sufficient area to permit the proper storage of filled and empty metal or other relatively non-absorbent refuse containers and their lids. It shall preferably be quipped with an efficient power exhaust ventilation system, hot and cold water outlets and adequate floor drainage. If this room is attached to the processing room, it should have an exit for removal of waste material directly to exterior of the building. The waste material should not pass into any processing room again.

3.11 Doors and Windows - The processing room shall be provided with effective means to prevent the entry of flies and insects. Such effective means may be screens, fans, etc. The processing rooms should by provided with self closing double doors. The doors and windows should be covered with flyproof wire gauze, and they should open outwards.

3.12 Drainage - Effective drainage should be provided to drain of a large quantity of water used for washing the raw material, machinery, equipment, furniture, floor, etc; 15 to 30 cm half circular drains with glazed pipe at th bottom should be provided. The slope of the floor should be towards

the drains and the farthest end of the floor from the drain should not be more than 5 m. The drain openings should be provided with screen traps to prevent solid matter from clogging the drains. The ends of the drains leading to the outside of the factory should be made rodent-proof by providing screens. The screens shall be examined periodally and replaced or cleaned, if necessary. The drains should have water seals of minimum 5 cm dia. At least 50 percent of the length of the drain should be covered to facilitate the movement of trolleys. Mesh type cover for the drain should be better to prevent habitation of cockroaches and rodents in closed areas of the drain.

4. Raw Material Handling

4.1 Raw material to be accepted for processing should not contain decomposed toxic or extraneous substances which cannot be removed to acceptable levels during processings. Raw materials so selected should be stored in premises that will protect them against contamination and infestation and minimize deterioration. Raw materials before being introduced into the processng line should be inspected, sorted so as to remove undesirable materials. Raw materials should be washed to remove soil or other contamination and the water so used should not be recirculated, unless it has been suitably treated to maintain in a condition which will not cause health hazard. The processing should be so done as to permit expeditious handling of consecutive units in

production under conditions which would prevent contamination deterioration, spoilage or development of infectious or toxigenic micro-organisms. The finally packaged materials, should be stored in clean premises which should provide appropriate protection from contmination or deterioration. Necessary methods of preservations and controls should be applied so as to protect them against contamination, infestation or development of public health hazard. the finished product should be transported under such conditions as will preclude the contamination with or development of pathogenic or toxigenic micro-organisms or infestation and protect against the deterioration of the product.

5. Factory and Processing hygiene

5.1 General Factory Hygiene

5.1.1 Waste and rubbish shall be collected in covered receptacles and shall not be allowed to scatter on the floor of the unit. It should be disposed of in a manner which is not detrimental to the hygiene of the surroundings of the disposal.

5.1.2 Adequate measures shall be taken to prevent mould growth on equipment and internal structures of processing and storage rooms. Adequate steps shall be taken to prevent infestation by cockroaches and other household pests.

5.1.3 When pesticides are used, due care shall be exercised to prevent contamination of equipment, raw materials and

packing materials. Under no circumstances shall these be used during processing.

5.1.4 Floors and drains shall be kept clean.

5.1.5 On no account shall the process room be used or converted to a store room for raw mateials or used as eating room. Only the items required for processing on a particular day shall be kept in the process room.

5.1.6 The premises where raw materials are stored should be separate from the premises and shall be free from dampness where final packaging is concluded. The places used for storage, manufacture of handling of edible foods should be separate from those used for inedible materials.

5.1.7 No lavatory, sink, cesspool or garbage shall be so situated or maintained that odours or fumes therefrom pervade any room where the product or raw materials are prepared or stored.

5.1.8 Proper places shall be provided for storage of brooms, brushes, buckets and other cleaning gear.

5.1.9 The factory effluents shall be disposed of from the factory in a manner which is not detrimental to the hygiene of the factory and its surroundings. The effluents shall not be let off on road or in the open outside the factory premises.

5.1.10 Window glass and light fittings shall be maintained clean and dust-free at all times.

5.1.11 There shall be no cobwebs in any part of the unit. Birds and domestic animals shall not be allowed in any part of the unit.

5.1.12 All plumbing and waste disposal lines should be large enough to carry peak loads. All lines should be water-tight and the waste disposal should be effected in such a manner as not to cause contamination with potable water-supplies.

5.1.13 Premises should be well lit and ventilated (see 3.3). Special attention should be given to euipment producing excessive heat, steam, obnoxious fumes or vapours. Good ventilation should be provided and mould growth in overhead structures should be prevented. Light bulbs and fixtures suspended above should be of safety type or otherwise protected in such a way as to prevent contamination in the case of breakage.

5.2 Plant and Equipment Hygiene

5.2.1.1. All surfaces coming into contact with the food shall be smooth, free from pits, crevices and loose scale and shall be non-absorbent. Furthermore, surfaces shall be non-toxic and unaffected by food products and cleaning compounds.

5.2.1.2 The finish of corrosion-resistant (stainless steel, nickel alloy, etc) surfaces shall be smooth.

5.2.1.3 The finish of cast and forged steel, and cast nickel alloy shall be smooth.

5.2.1.4 The use of galvanized sheets as food contact surfaces shall be minimum.

5.2.1.5 Copper and its alloys shall not be used in the equipment where oils and fats, chocolate liquor, acid fruits, and other fatty food products come in contact with the metal.

5.2.1.6 Cadmium and lead shall not be used where they may come into contact with any food.

5.2.1.7 Plastics shall be abrasion-resistant, heat-resistant to the degree needed for the product and for the cleaning process, and shatter-proof, and shall not contain free phenol, formaldehyde, or a constituent which may result in the migration of any of the substances to the food or otherwise affect the characteristics of the food with which it comes in contact.

5.2.1.8 All gasketing and packing materials shall be non-porous, non-absorbent, and fitted in a manner such as to prevent its protruding into the product or creating recesses or ledges between the gasketted joints which will interfere with proper cleaning.

5.2.1.9 Whereever food normally comes in contact with the equipment surfaces, coatings used as a lining to prevent corrosion of the base material of food equipment shall be

non-toxic, unaffected by an inert to the food in contact with it or cleaning preparation used on it. Furthermore, such coatings shall be non-absorbent, odourless and tasteless.

5.2.3 Installation of Equipment

5.2.3.1 All equipment shall be installed on a foundation of durable, easily cleanable material.

5.2.3.2 Equipment shall be placed at least 45 cm from walls and ceiling, or sealed water-tight thereto. All portions of the equipment shall be installed suficiently spaced above the floor on a minimum number of supportng members to provide access for inspection and cleaning, or be installed completely sealed (water-tight) to the floor.

5.2.3.3 Whenever equipment passes through walls or floors, it shall be scaled there to or sufficient clearance shall be allowed to permit inspection, cleaning and maintenance.

5.2.3.4 Where necessary, drains and catch pans shall be provided. These shall be of such dimensions as to collect all spill and drip, and readily accessible or readily removable for cleaning.

5.2.3.5 Where pipes pass through ceilings in the floor above of processing areas, pipe sleeves shall be inserted in the floor above so that their upper periphery is at least 5 cm above the floor.

5.2.5 - Connections - All electrical connections, such as switch boxes, control boxes, conduit and cables, shall be installed at least 45 cm away from the equipment and walls to facilitate cleaning, or be completely sealed to the equipment or wall.

5.2.6 All equipment coming into contant with raw mateials or the product shall be kept clean. An ample supply of steam and water, hose, brushes, detergents and other equipment necessary for the proper cleaning of machinery and equipment shall be available.

5.2.7 All parts of equipment coming in contact with food shall be sterilized by steam or any other suitable sterilizing agent after each processing run.

5.2.8 The entire processing system shall be cleaned at the close of opeation and flushed out with potable water prior to use.

5.2.9 Contaminating stores and spare parts of machinery shall be kept separate from the processing areas and unprotected edible raw materials.

5.2.10 Lug boxes, bottles, pails and other containers used to transport or store raw materials shall be kept clean and not used for any other purpose.

5.2.11 Container cleanliness - It shall be ensured that containers are clean. The containers shall not be stacked in a manner which allows the contamination of the product.

5.3 Water supply

5.3.1 There shall be an adequate supply of safe and potable water. Running water under pressure shall be easily accessible to all rooms and areas in which food is handled and equipments are washed.

5.3.2 The equipment shall be so installed and used that back siphonage of liquid into the potable water lines is precluded.

5.3.3 Hot and cold water in ample supply shall be provided for plant clean-up needs, where necessary.

5.3.4 The storage tanks for water should, unless completely sealed, be kept covered with tight fitting lids, examined regularly and cleaned out at least once every six month. The date of the last cleaning and next cleaning shall be prominently displayed on the storage tanks.

5.3.5 The water shall be periodically examined as desired by the Licensing Authority, chemically and bacteriologically. A record of such examination shall be maintained.

6. Operation Practices and Production Requirements

6.1 Sanitation Control Programme - It is desirable that each processing unit in its own interest should appoint an individual who is responsible for maintaining the clenailess of the plant. The staff so employed should be well trained in the use of special cleaning tools, methods of

disassembling equipment for cleaning and in the significance of contamination and hazards involved.

6.2 Laborarory Control Procedures - In additiion to any control by the official agencies having jurisdiction, it is desirable that each processing unit should have access to laboratory control of the hygienic quality of the products processed. Such controls should reject foods that are unfit for human consumption.

6.3 End Product Specifications - Microbiological, chemical, physical or extraneous material specifications may be specified for each processing unit depending upon the nature of the food. Such specifications may include sampling procedure, analytical methods, warranty period, batch number, etc.

7. Employee Hygiene

7.1 Every person employed for food handling in the factory shall be medically examined by an authorized registered medical practitioner and the examination shall include X-Ray of the chest for tuberculosis. The examination shall also include: examination of stool for protozoal and helminthic infestation for those parasites which are transmitted by ingestion, and for the presence of Salmonela, Shigella species and Vibrio cholerae; urine; and blood examination for veneral diseases. Subsequently, the employee shall be medically examined once in a year or more frequently; if

necessary, to ensure that he is medically fit and free from communicable diseases. A record of such examination shall be maintaned.

7.1.1 It shall be impressed on all employees that they should notify the medical officer or management, cases of fever, vomiting, diarrhoea, typhoid, dysentery, boils, cuts and sores and ulcers (however small), discharging ears and notifiable diseases occuring in their own homes and families.

7.1.2 No worker who is suspected to be suffering from any of the disorders listed in 7.1.1 shall be permitted to work inside the unit. The supervisor shall check the personal hygiene of the workers before the start of work and whenever they enter any processing room after any absence.

7.2 Employees shall keep their finger nails short and clean and wash their hands with soap or detergent and water before commencing work and after each absence, specially after using sanitary conveniences. Towels used for drying hands should be clean. No worker shall allow his hands or any part of his body or clothing to come in contact with the food. He should adopt strict hygienic practices so as to avoid adding any microbial contamination to the material.

7.3 All employees shall be inoculated and vaccinated against the enteric groups of diseases once a year and against smallpox once in two years. In case of an epidemic all workers shall be inoculated. A record shall be maintained.

7.4 No worker shall be allowed to work without proper clothing and foot wear.

7.5 Employees shall be provided with clean uniforms (preferably white) or aprons or both and clean washable caps, where necessary.

7.5.1 Separate room or place for changing the clothes shall be provided. The clothes shall not be hung in any processing room.

7.5.2 The uniforms shall not be worn outside the plant but put on just before starting the work and changed when leaving.

7.6 Eating, spitting, nose cleaning or the use of tobacco in any form or chewing betel leaves shall be prohibited within the manufacturing, packing and storage area of the unit. Notice to this effect shall be prominently displayed and enforced.

7.7 Sufficient and suitable sanitary conveniences shall be provided, maintained and kept clean in every factory. The conveniences shall be properly lighted. Separate conveniences shall be provided for each sex. No convenience shall open directly into any work room in the factory. The conveniences shall always be maintained clean and in good repairs.

7.8 Sufficient number of wash basins with adequate provision of nail brushers, soap and towels, latrines and urinals in the prescribed manner should be provided, conveniently situated and accessible to workers at all times while they are at the factory. The wash basins shall be installed in or alongside the sanitary conveniences.

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